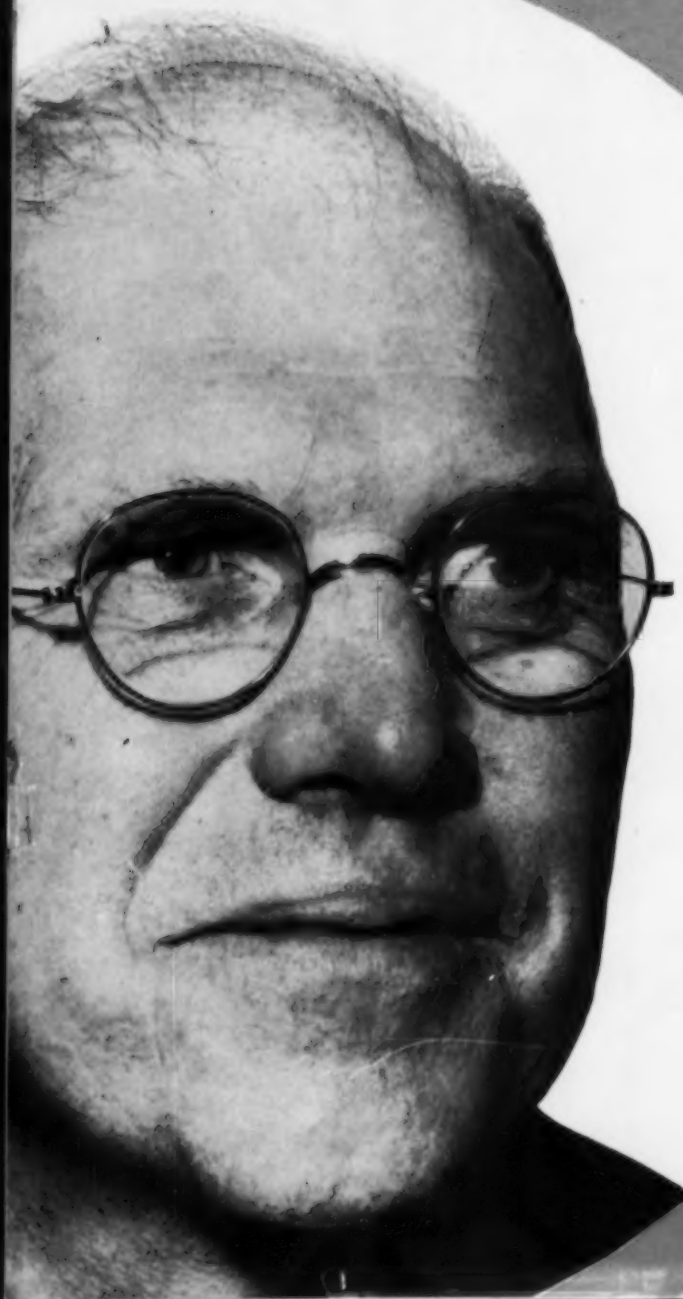
JULY 9, 1956

STEEL
The Metalworking Weekly

A PENTON PUBLICATION

✔ Lubrication in Drawing —page 86

✔ Growth in Metal Powders —page 139



Boom in Missiles

"Best subcontracting chances are in airframes, propulsion systems, handling equipment," says E. V. Murphree, Pentagon missile expert...page 63

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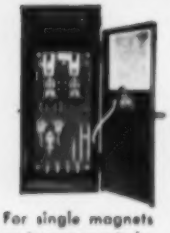
For faster load discharge...low cost operation...longer life...

EC&M Magnet Controllers have earned a reputation for improved magnet operation. Loads are discharged quickly . . . cleanly . . . without "dribble". Magnets "work more" because faster drops eliminate "positioning" the magnet at point of discharge.

A simple two-position (lift-drop) Master Switch makes operation easy . . . power is off when the master switch is in the drop position. This prevents overheating, keeps lifting capacity high, and substantially adds to magnet life.



For single magnets or two magnets in parallel . . . Type AD STANDARD Controller has exclusive adjustable discharge feature for different type loads. (dial on door).

BOOSTER Controller gives increased pull-away power from pile, then carries load at reduced current.

HIGH SPEED RELEASE DLM-335-A Controller reduces discharge time of deep-type magnets 50%.

EC&M Controllers may be used with all types and makes of magnets.

Write for Bulletin 905

SQUARE D COMPANY

EC & M DIVISION . CLEVELAND 28, OHIO

6169

Awesome press contains longest forgings ever made

Without seeing this incredible press at close range, it is difficult to grasp its true magnitude. Only a portion of the giant apparatus is shown in the photograph. Actually, it is as tall as an eleven- or twelve-story building, but the major part of it is underground. Considerably less than half of its height is visible above the working floor.

Designed and built by Loewy-Hydropress, Division of Baldwin-Lima-Hamilton Corp., this king of machines is rated at 50,000 tons. It is installed at the Wyman-Gordon-U. S. Air Force plant, North Grafton, Mass., where it is used in the making of large airplane components. It can, for example, forge an entire aluminum wing spar with a single mighty squeeze.

Speaking of forgings, the press itself actually contains some record-breakers. Its six columns consist of the eighteen longest forgings ever made. Eighteen identical steel sections, each with an overall length of 108 ft! All of these pieces were forged by Bethlehem in its Bethlehem, Pa., shops; so, too, were the crosshead supports, platen side rails, and certain other parts.

It is rare that a forge shop receives an assignment presenting such a challenge. It took months of painstaking effort to produce the column sections, but Bethlehem facilities were equal to the job. These same facilities are available to any customer who needs steel forgings. When we can be of service to you, please call or write.

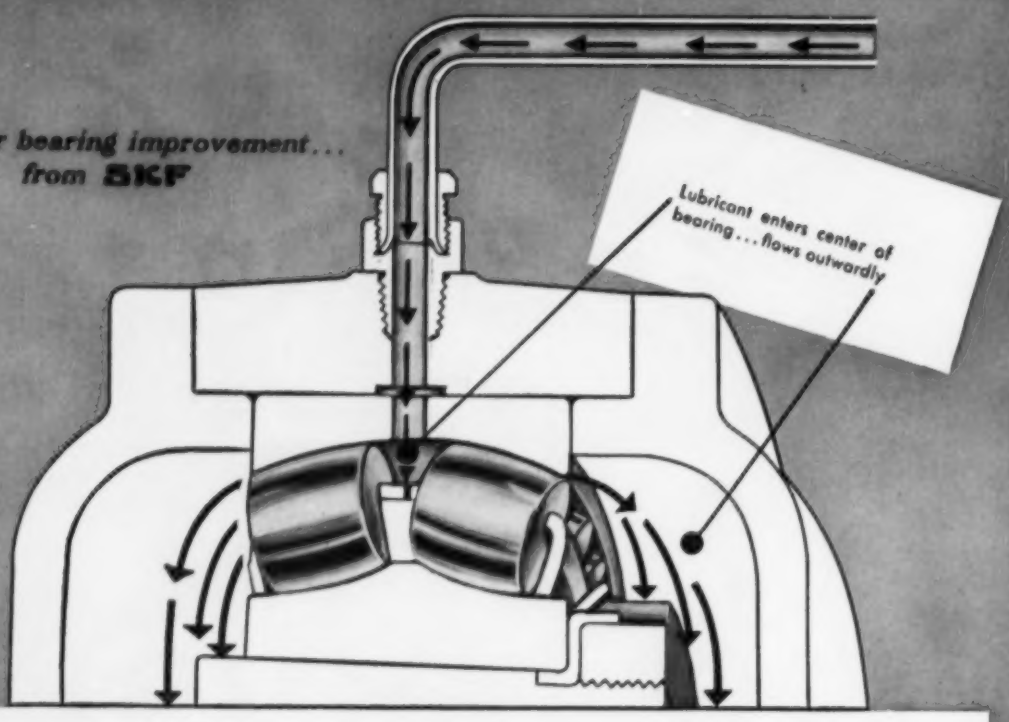
BETHLEHEM STEEL COMPANY, BETHLEHEM, PA.

On the Pacific Coast Bethlehem products are sold by Bethlehem Pacific Coast Steel Corporation
Export Distributor: Bethlehem Steel Export Corporation

BETHLEHEM STEEL

BETHLEHEM STEEL

Another bearing improvement... from **SKF**



NOW AT NO EXTRA CHARGE-

SKF's improved method of lubricating large spherical roller bearings

To make the lubricant effective it should be located where needed—in the bearing. Also, new lubricant, when added, should enter where it does the most good—in the bearing.

For these reasons, all future production of SKF double row spherical roller bearings above 240 mm O.D. (9.4488") will be made with three equally spaced drilled holes in the center of the outer ring without any extra charge to our customers. *This permits the lubricant to enter the center of the bearing.*

With the lubricant (either grease or oil) being introduced into the center of the bearing, all working surfaces are quickly and completely covered. In addition, the outward flow flushes out the old lubricant, and with it, any abrasive dust, dirt, moisture or other impurities.

And where circulating oil lubrication is required, there is a continuous flushing and cooling of the bearing.

This is another example of how SKF helps you to obtain longer bearing life.

7711

Consult your SKF District Office today for complete information so that you can be the first to incorporate into your products this improved method of lubricating large spherical roller bearings.

SKF®

BALL AND ROLLER BEARINGS

SKF INDUSTRIES, INC., PHILADELPHIA 32, PA.

—manufacturers of **SKF** *and* HESS-BRIGHT® *bearings.*

This rope can take it!

MONARCH WHYTE STRAND WIRE ROPE BY MACWHYTE

Wherever you put wire rope to work, you need rope designed and made to earn its way on your toughest requirements, under severest service conditions.

To provide you with exactly the *right* rope for each requirement, MONARCH WHYTE STRAND is made in every wire rope classification, PREformed and Internally Lubricated, Lang Lay or Regular Lay, with Fiber Core or Independent Wire Rope Core.

Put MONARCH WHYTE STRAND to the test on your equipment, you will be more than pleased with its performance.

Prices, literature, and catalog available through any Macwhyte distributor; or write direct.

MACWHYTE WIRE ROPE

Macwhyte Company, 2912 Fourteenth Avenue, Kenosha, Wisconsin

Ask for MONARCH WHYTE STRAND Bulletin 5425

Manufacturers of: Internally Lubricated PREformed Wire Rope, Braided Wire Rope Slings, Aircraft Cables and Assemblies, Monel Metal, Stainless Steel Wire Rope, and Wire Rope Assemblies.

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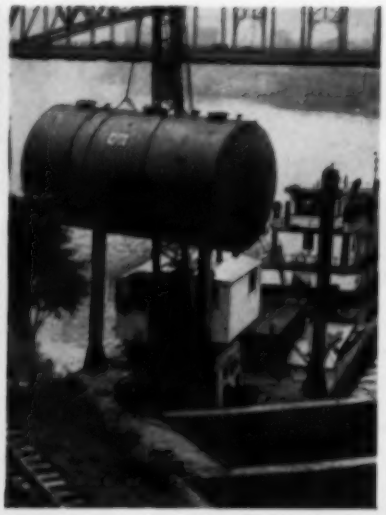
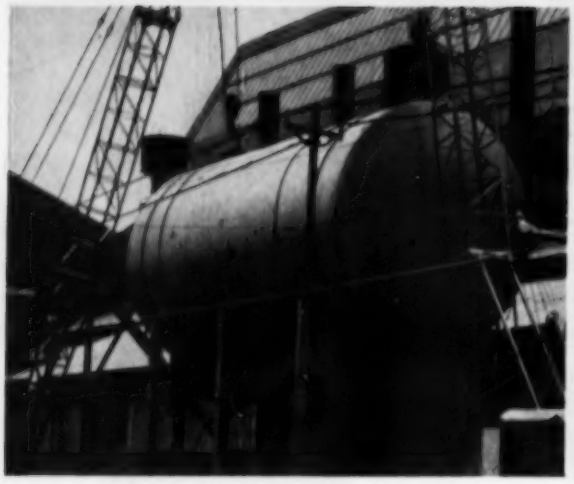
New York 4, 35 Water St.
Pittsburgh 19, 704 Second Ave.
Chicago 6, 228 So. Des Plaines St.
Detroit 3, 75 Oakman Blvd.
St. Paul 14, 2356 Hampden Ave.
Ft. Worth 1, P.O. Box 605
Portland 9, 1603 N. W. 14th Ave.
Seattle 4, 87 Holgate St.
San Francisco 7, 188 King St.
Los Angeles 21, 2035 Sacramento

Distributors conveniently located throughout the United States





GOODYEAR INDUSTRIAL PRODUCTS

G-T-M - Specified Typical Uses for PLIOWELD

(corrosion-resistant rubber lining or covering)

- **Tanks**—rectangular, round, square, open top, flat or dished heads
- **Tank Covers**—flat, box, radius types
- **Truck Tanks**
- **Tank Barges**
- **Railroad Tank Cars**
- **Fans**—blades, wheels, housings
- **Flanged Pipe and Fittings**
- **Fume Hoods and Ducts**
- **Scrubbers and Towers**
- **Air Purifiers**
- **Agitators**
- **Troughs and Chutes**
- **Continuous Vacuum Filters**
- **Pumps**
- **Filter Frames**
- **Miscellaneous Fabricated Items**

PLIOWELD can also be used to combat abrasion

G.T.M. completes another "turn-key" tank lining job

For stream pollution abatement, an eastern steel mill needed a number of big tanks to collect and treat waste pickle liquor—four 45,000-gal. storage tanks, three 41,000-gal. storage and leaching tanks, and five smaller tanks.

The G.T.M.—Goodyear Technical Man—recommended lining the tanks with PLIOWELD—especially compounded corrosion- and abrasion-resistant rubber. He also agreed to handle the complete job "from blueprints to saddles." This included procurement of tanks, lining at fabricator's plant, and movement by barge and truck to customer's plant. And this involved hiring movers and equipment, obtaining rights of way, moving telephone and electrical wires, making police and traffic arrangements.

The net result was a "turn-key" job, delivered as ordered, with no problems for the customer. Like to have your lining job handled the same way? Just turn it over to the G.T.M.! Contact him through your Goodyear Distributor, or write Goodyear, Industrial Products Division, Akron 16, Ohio.

PLIOWELD TANK LININGS by

GOODYEAR

THE GREATEST NAME IN RUBBER

Pliowald—T. M. The Goodyear Tire & Rubber Company, Akron, Ohio

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The Metalworking Weekly

July 9, 1956 Vol. 139 No. 2

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Here's the Magic
SKETCHFORMING SET

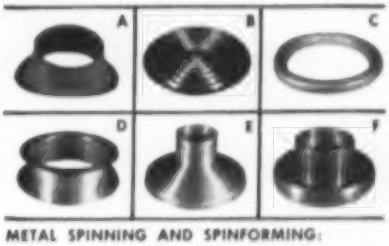
THAT SAVES YOU

DAYS AND DOLLARS . . .

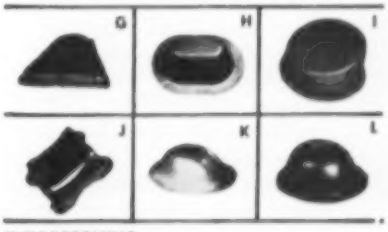
Makes clean copies instantly, without carbon paper. Keyed block background in light grey aids sketching and permits quick reference to details when discussing by telephone. Write Roland Teiner, Everett 49, Mass. for free copies. Use them to request quotations, order models or to develop cost reducing engineering changes.

TRY TEINER

for all fabrications including metal spinning, spinforming, hydroforming, welding and finishing.



METAL SPINNING AND SPINFORMING:
Typical items: A—Aircraft detail; B—Decorative cover; C—Retainer ring; D—Winding reel; E—Electronic shield; F—Electrical detail.



HYDROFORMING:
Typical items: G—Aircraft detail; H—Spindle cover; I—Aircraft detail; J—Auto bracket; K—Light reflector; L—Air cleaner.

ROLAND TEINER Company, Inc.

DEPT. 30 · 134 TREMONT STREET, EVERETT 49, MASS.
Telephone Everett 7-7800
ENGINEERING REPRESENTATIVES IN PRINCIPAL CITIES

FILL OUT COUPON
FOR FACTS, SAMPLES

ALUMINUM COMPANY
OF AMERICA
2250 G Alcoa Bldg., Pittsburgh 19, Pa.
Gentlemen:
Please send complete specification data and samples of your aluminum fasteners.
Name
Title
Company
Address

An Alcoa Aluminum Fastener should be used here!

It's an aluminum awning assembly, worth the lasting strength of Alcoa® Aluminum Fasteners. You avoid galvanic and atmospheric corrosion. You get perfect color match; you get the very highest quality product. Your local Alcoa distributor has a complete stock.

P.S. In this awning assembly, we suggest an aluminum sheet metal screw. One from Alcoa's complete line of aluminum fasteners.

THE ALCOA HOUR
TELEVISION'S FINEST LIVE DRAMA
ALTERNATE SUNDAY EVENINGS

YOUR GUIDE TO THE BEST IN ALUMINUM VALUE

ALCOA ALUMINUM

behind the scenes

Readers Vs. Artists

We thank all those helpful persons who took the trouble to sift through the June 11 issue of STEEL in search of advertisements previously selected by artists. True, the contest didn't prove anything you didn't know before: Artists are still unpredictable; advertising counselors are not always on the beam, pointed due north—but readers seem to know what they like and don't like, in spite of continued exposure to merchandising psychology and advertising fallout.

Once more it has been demonstrated that advertising is all things to all men. Ads containing engineering drawings appeal to draftsmen; ads showing steel mill operations appeal to steel mill men; advertising managers like close-ups of functioning products. Sometimes a reader's interest can be determined by his mood. Today he'll be intrigued by a romantic illustration, whereas tomorrow he'll think it stinks. No wonder creative advertising personnel crack up early.

Our contest was: "Guess which ads the artists picked?" And, as you may know, artists are so punchy they have been known even to bite themselves. Our group, after quarreling over the quality of the works they were urged to judge, selected these ads from the June 11 issue of STEEL: 1. R. D. Wood Co. 2. Clark Equipment Co. 3. Danly Machine Specialties Inc. 4. Midvale-Heppenstall Co. and Inland Steel Co. (tied). 5. Crucible Steel Co. of America and SKF Industries Inc. (tied). 6. Bethlehem Steel Co. and Ansul Chemical Co. (tied).

Mentioned were: Colorado Fuel & Iron Corp., Virginia Electric & Power Co., Stupakoff Division of the Carborundum Co., John A. Roebling's Sons Corp., Cleveland Welding Division, American Machine & Foundry Co., and Bethlehem Steel Co.

In a grim attempt to follow an artist's reasoning, many of our guests strayed away off base. Curiously, the overwhelming favorite among readers was Roebling's; it was far in front. Readers, naturally, are always right. In this instance, they really showed their independence.

There is a strong temptation to remain here with the curiosities and anomalies exposed by this cross section of opinion, to speculate, infer, imply and draw comparisons, but we can't, folks: There's a hongry man out in Iowa shoutin' for his vittles. Philip E. McCafferty, of Stanwood, Iowa, listed four winners and two mentions, thereby nosing out all competition. Phil listed SKF, Inland Steel, Ansul Chemical, Clark Equipment, Roebling's and Bethlehem Steel. We mailed our corn-fed swami a check for a sawbuck in the pious hope it may get there before Mrs. McCafferty collapses, because himself remarked that they were holding off eating until the free chow showed up.

The Public Speaks

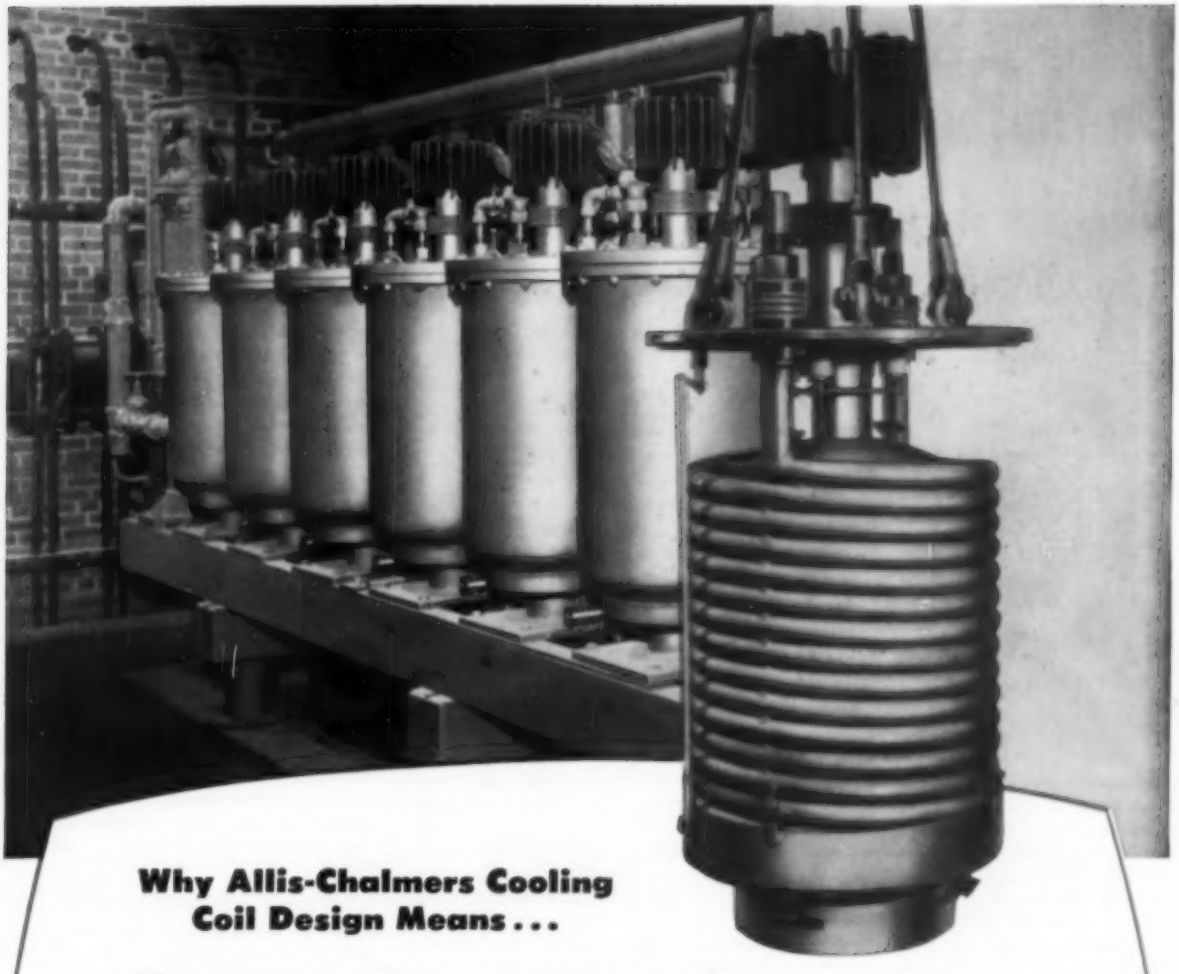
Replies came from points as far apart as Sydney, Nova Scotia, and Spokane. A careful count revealed that 42 advertisements were selected for consideration. Only one remarkably independent contestant managed to select six ads that were entirely overlooked by artists and readers; he did this by delving into a later issue of STEEL. Here's the consensus of reader selection:

1. Roebling's. 2. Danly Machine Specialties Inc. and Clark Equipment Co. (tied). 3. Midvale-Heppenstall Co. 4. Inland Steel Co. 5. McKay Machine Co. (the artists skipped this one). 6. SKF Industries Inc., Research-Cottrell Inc. and Bethlehem Steel Co. (a three-way tie).

Replies are still coming in, and we hate to call it off, but there's a holiday coming up, and we have to go to press early this week—and *all* contests have to end some time. Again, thanks to everybody who came up with an opinion; it's too bad there isn't space enough to include some of those wonderful side comments. We've 'ad such a jolly go of it, perhaps we ought to 'ave another bash at it later on, what?

Shrdlu

(Metalworking Outlook—Page 47)



Why Allis-Chalmers Cooling Coil Design Means . . .

Better Rectifier Operation

More Efficient Heat Transfer results from internal cooling coil. The steel coil surrounds active parts, offering more cooling surface and better heat transfer than other types. Unit maintains more uniform temperature and mercury vapor pressure.

Simplified Maintenance results from Allis-Chalmers unique unit construction. All active components are attached to the anode plate for easy withdrawal, dismantling, and re-assembling — as illustrated above.

Positive Arc Barrier is formed by the cooling coil, which is insulated from the tank. The main arc is confined within the coil, preventing arc transfer to the tank.

Years of Operation in hundreds of installations have proved the reliability, ease of operation, and simplified maintenance of Allis-Chalmers mercury arc rectifiers. You can get complete information at your nearby A-C office, or write Allis-Chalmers, Industrial Equipment Division, Milwaukee 1, Wisconsin.

LIVE BETTER ELECTRICALLY

ALLIS-CHALMERS

A-C ALLIS-CHALMERS

A-5094

(Advertisement)

Special Reports On Finishing Non-Ferrous Metals

NUMBER II—Paint Base, Corrosion-Resistant Finishing with Iridite

WHAT IS IRIDITE®

Briefly, Iridite is the tradename for a specialized line of chromate conversion finishes. They are generally applied by dip, some by brush or spray, at or near room temperature, with automatic equipment or manual finishing facilities. During application, a chemical reaction occurs that produces a thin (.00002" max.) gel-like, complex chromate film of a non-porous nature on the surface of the metal. This film is an integral part of the metal itself, thus cannot flake, chip or peel. No special equipment, exhaust systems or specially trained personnel are required.

Chromate conversion coatings are well known and accepted throughout industry as an economical means of providing corrosion protection, a good paint base and decorative finishes for non-ferrous metals. However, continued developments have been so rapid and widespread that many manufacturers may not be completely aware of the breadth of application of this type of finish. Hence, this digest of current information; to bring you up to date on the many ways in which you can obtain proper surface preparation for painting and increase product durability with a single multi-purpose chemical pretreatment. Report I on decorative, corrosion-resistant finishes and Report III on chemically polished, corrosion-resistant finishes are available on request.

First, it is an accepted fact that metal surfaces should be prepared before painting to make possible an efficient paint system. Naturally, this preparation should provide for good initial paint adhesion. Chemical treatments have proved extremely effective in this respect, particularly those of a neutral or preferably acid nature. Further, to be most efficient, chemical treatments should provide a non-porous barrier to maintain adhesion by sealing the metal from the paint and moisture. They should also provide a self-healing film which prevents lateral corrosion in the event that bare metal is exposed through scratching.

The Iridite chromate conversion coatings meet all these requirements. Iridite is a chemical conversion treatment for surface preparation. It provides initial paint bonding by molecular adhesion. It is acid in nature and produces a film that is gel-like and non-porous in structure. Thus, the Iridite film effectively seals the metal from the paint and from moisture penetration. Because the film contains certain relatively soluble constituents, it will protect areas scratched through to bare metal and prevent lateral corrosion. This is accomplished by a gradual leaching of these constituents into the damaged area.

Further, because of its gel-like, non-crystalline nature, the Iridite film will not affect the appearance or texture of the paint film, nor will it dust or powder to mar the painted surface. Because the film is non-porous, paint coverage is increased, thus substantial savings in paint costs will be realized. In addition, treated parts may be stored for long periods of time prior to painting without the risk of entrapped moisture causing blistering when painting.

Iridite chromate conversion coatings are widely used with equal ease and success under both baked and air-dried paint systems. While the actual adherence properties of the Iridite film do not increase appreciably with its thickness, corrosion protection does. The protection of the Iridite film is proportionate to its thickness and should be taken into consideration when selecting the Iridite to meet your needs. However, it is sometimes necessary to sacrifice maximum corrosion protection for appearance when a finished part is to be only partially painted. For example, it may be desirable to use a thin, clear, bright Iridite film if the unpainted areas must present a chrome-like appearance. A typical case is that of instrument housings on which the exterior is painted and the inside left unpainted.

On the other hand, if all surfaces of the product are to be painted and maximum corrosion protection is required, the heavier and most protective Iridite films should be used. For example, all surfaces of zinc die cast fruit juicers are finished with a highly protective Iridite film prior to painting to provide maximum resistance to the corrosive action of fruit juices.

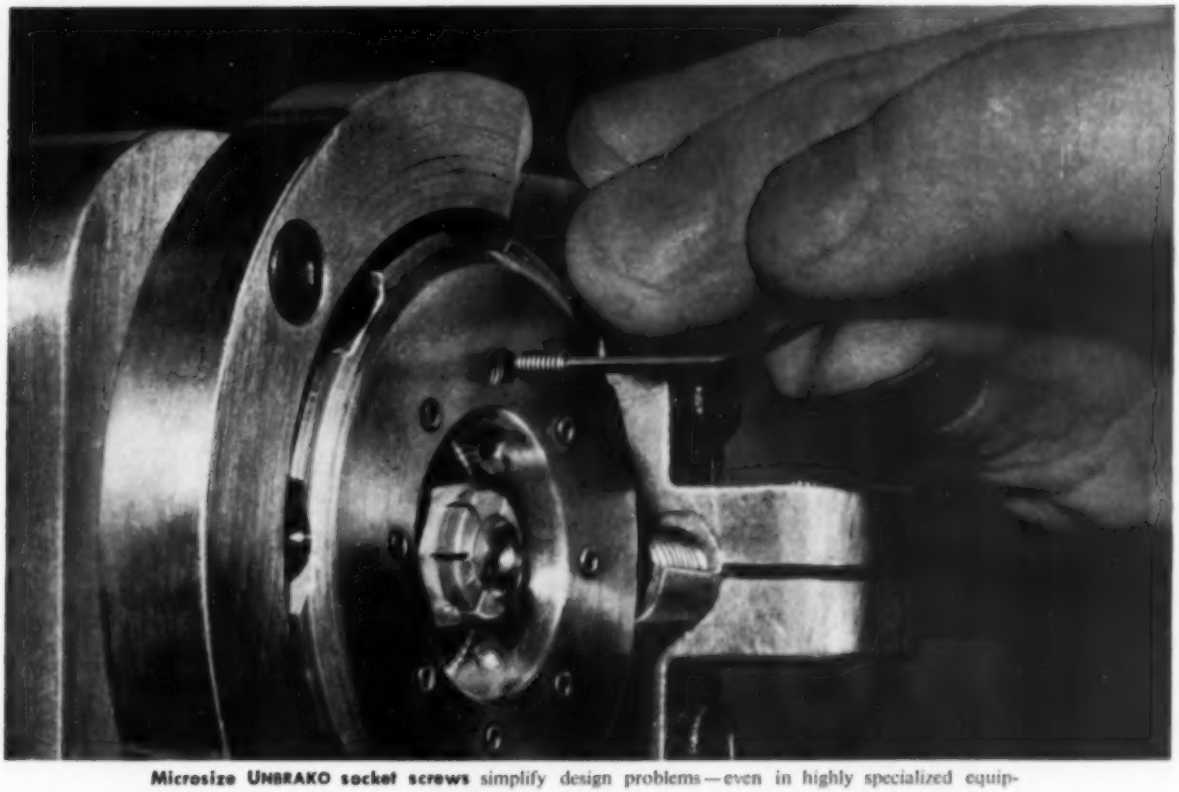
Iridite finishes are now available for all commercial forms of the more commonly used non-ferrous metals, including zinc, cadmium, aluminum, magnesium, silver, copper, brass and bronze. In addition to providing an excellent base for paint, the Iridite films also have high decorative value when used as final finishes in themselves.

These films can produce a wide variety of pleasing appearances including clear bright, iridescent yellow, bronze, olive drab and brown. In addition, many films can be modified by bleaching or by dyeing. Among the dye colors available are various shades of red, yellow, green, blue or black.

In planning or designing, you should consider the many other characteristics of Iridite finishes which may enter into the specific problem. In addition to their functions as protective and decorative finishes, and as bases for organic finishes and bonding compounds, Iridites have low electrical resistance. Some can be soldered and welded. The film does not affect the dimensional stability of close tolerance parts.

Iridites are widely approved under both Armed Services and industrial specifications because of performance, low cost and savings of materials and equipment.

You can see then, that with the many factors to be considered, selection of the Iridite best suited to your product requires the services of a specialist. That's why Allied maintains a staff of competent Field Engineers—to help you select the Iridite to make your installation most efficient in improving the quality of your product. You'll find your Allied Field Engineer listed under "Plating Supplies" in your classified telephone book. Or, write direct and tell us your problem. Complete literature and data, as well as sample part processing, is available. Allied Research Products, Inc., 4004-06 East Monument Street, Baltimore 5, Maryland.



Microsize UNBRAKO socket screws simplify design problems—even in highly specialized equipment like this prototype precision loading device for use in advanced automated production operations.

Miniaturize with UNBRAKO set screws

HEAT-TREATED ALLOY STEEL*
PLAIN CUP POINT
Class 3 Fit Standard

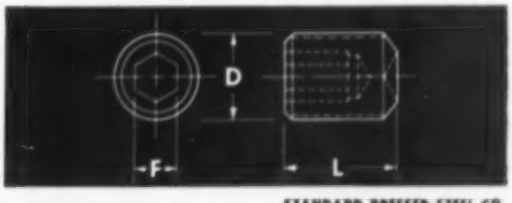
Diameter		Threads per inch NC	Threads per inch NF	L Overall Length	Recommended Installation Torque in Inch-Pounds NC	Recommended Installation Torque in Inch-Pounds NF	Weight per Box of 100 in Pounds
#0	D .060 F .028	..	80	1/16	..	.5	.01
		..	80	3/32	..	.5	.01
		..	80	1/8	..	.5	.01
		..	80	5/32	..	.5	.01
		..	80	3/16	..	.5	.01
		..	80	1/4	..	.5	.01
#1	D .073 F .035	..	72	1/16	..	1.5	.02
		..	72	3/32	..	1.5	.02
		..	72	1/8	..	1.5	.02
		..	72	5/32	..	1.5	.02
		..	72	3/16	..	1.5	.02
		..	72	1/4	..	1.5	.02
#2	D .086 F .035	56	..	1/16	1.5	..	.03
		56	..	3/32	1.5	..	.03
		56	..	1/8	1.5	..	.03
		56	..	5/32	1.5	..	.03
		56	..	3/16	1.5	..	.03
		56	..	1/4	1.5	..	.03
#3	D .099 F .050	48	..	3/32	5.0	..	.04
		48	..	1/8	5.0	..	.04
		48	..	5/32	5.0	..	.04
		48	..	3/16	5.0	..	.04
		48	..	1/4	5.0	..	.04

*Also available in stainless steel

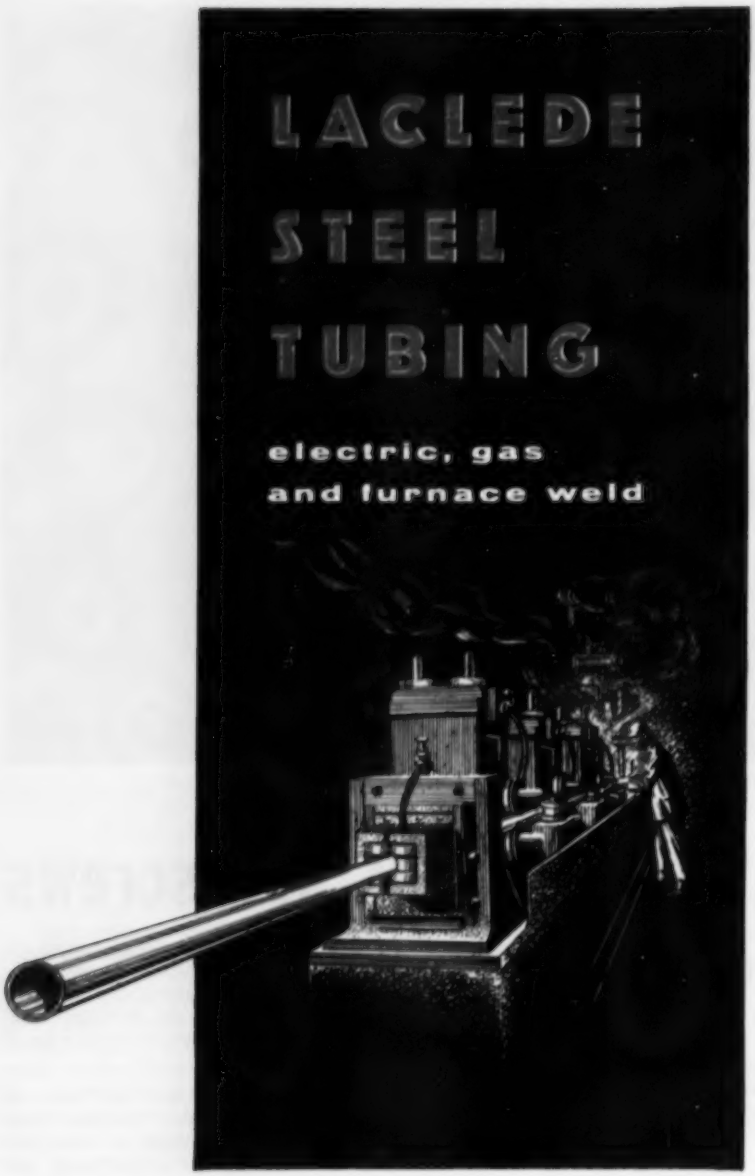
You need not design special set screws to secure your new miniaturized equipment. Microsize UNBRAKOS were developed specifically for use in modern small devices.

UNBRAKO screws are made of carefully selected alloy steel. They are manufactured to timepiece precision. Sockets are deep and uniform for greatest wrench engagement and longest reuse. Threads are fully formed for maximum strength and exact fit. And UNBRAKOS are heat treated to the optimum condition for high tensile strength and ductility without brittleness or decarburization.

Ask your authorized industrial distributor about microsize UNBRAKO socket screws today. Or write us for Bulletin 2055 and samples. Unbrako Socket Screw Division, STANDARD PRESSED STEEL CO., Jenkintown 33, Pa.



STANDARD PRESSED STEEL CO.
UNBRAKO® SOCKET SCREW DIVISION SPS
JENKINTOWN PENNSYLVANIA



from
QUALITY CONTROLLED STEEL
to produce the best
in manufactured
products

LACLEDE STEEL COMPANY
SAINT LOUIS, MISSOURI

LETTERS
TO THE EDITORS

Management Series Disappears

I had been keeping a file of the 1956 STEEL Program for Management series, along with the copies from last year. However, all seems to have disappeared.

They're terrific and most helpful in my particular line of work.

Would it be possible to get extra reprints of the series so far this year? I could also use a set from last year if you can find anyone who wants to part with it.

Gerry Gilbert
Atlas Mineral Products Co.
Mertztown, Pa.

• *Single copies of the 1956 management series are available without cost on request. A limited number of the ten articles in the 1955 series also is available.*

Articles Help Analyst

Please send three reprints of the article, "Heat Treating Superstrength Steels" (June 18, page 150). The timely, well-written articles in your magazine are both helpful and interesting.

Herbert S. Burkin
Process Analyst
Convair
Division of General Dynamics Corp.
San Diego, Calif.

Attention-Getting Idea

A parishioner has called my attention to the article, "Ideas for Industry" (Apr. 23, page 105). I would like to get a copy.

The Rev. Norman Temme
First Lutheran Church
Omaha, Neb.

Please send 25 copies. We are impressed with this article and intend to distribute copies to our tin plate supervisory personnel.

J. W. McKean
Tin Plate Office
Aliquippa Works
Jones & Laughlin Steel Corp.
Aliquippa, Pa.

Article Sells Aluminum

Please mail up to 25 copies of the article, "Auto Makers Take to Aluminum Trim" (Feb. 27, page 110).

As manufacturers of rolled metal moldings, we find this article is of much benefit in pointing out forcibly to our customers the new trends in aluminum.

Ray A. McShurley
Sales Department
Acme Machine Products
Division of the Herrick Corp.
Muncie, Ind.

Readership Impresses President

Thank you for the tear sheets of the article, "On The Threshold of a Boom" (June 11, page 112), telling about honeycomb panels.

Since this article appeared, we have received a half-dozen inquiries from top executives of well known corporations. We are impressed with the apparent caliber of your readership.

We would like to point out that we

(Please turn to page 12)

LANDIS PIPE THREADING MACHINES

. . . 4 Major Features Increase Efficiency

1. WIDE RANGE—Just three LANDIS Pipe Machines (2", 8" and 18") will thread all diameters of pipe from ½" to 18". Each machine is constructed so as to handle a wide range of pipe sizes—for example, the 6" machine will thread all diameters from 1" to 6". Universal size adjustment allows quick set-up.

2. DIE HEAD EFFICIENCY—The design of Stationary heads provides maximum rigidity on all diameters within their range. Positive locking action is assured through a self-locking toggle joint. Size adjustment is quickly and easily obtained through the use of a single locking nut.

3. LOW TOOL COST—Chasers operate at a tangent to the work. Line contact at cutting edge reduces friction. Permanent throat assures even chip distribution. Variable rake affords proper cutting edge for different materials. Landis chasers are useable for 80% of their original length. They are individually replaceable and, within the range of a given die head, a single set can be used for all diameters of the same pitch, form and taper.

4. PRECISION TAPERED THREADS—The Receding Chaser Pipe Machines are especially designed to cut tapered threads to meet A.P.I. requirements. Chasers recede into the die head at a rate equal to the taper of the thread, ensuring accurate and uniform taper along the full thread length.

LANDIS *Machine* CO. WAYNESBORO PENNSYLVANIA

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gains over 1,000 new users in 2 years

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Performance has been the persuader in switching users to Wheelabrator Steel Shot. More than 1,000 users have changed from other abrasives to Wheelabrator Steel Shot in 2 years strictly on the basis of faster, more thorough and more economical cleaning obtained with this premium steel shot. It is the only shot with all the qualities vital to lowest-cost cleaning and peening. Its high hardness gives super cleaning speed. Its toughness gives extra long life for low maintenance costs. The proof that these qualities are facts, not just claims, is in the growing list of users who have changed to Wheelabrator Steel Shot from other abrasives. Try it today. It's the low-cost answer to your cleaning and peening problems.

Wheelabrator Steel Shot is now available in the new S. A. E. size S-280

Write now for your copy of Catalog 89-B.

WHEELABRATOR CORPORATION

WORLD'S LARGEST MANUFACTURER OF STEEL ABRASIVES

509 S. Byrkit Street — Mishawaka, Indiana

LETTERS

(Concluded from page 10)

are not limited to the 0.040 wall thickness. We have extruded 0.025 and 0.018 in considerable volume. To date, we have not tried to go thinner, but we believe we can go down to 0.002 to 0.005 without any undue difficulty.

R. J. Harkenrider
President
Multiple Extrusions Inc.
Winona, Minn.

Wants Report Sight Unseen

Please send a tear sheet of the article, "The Brass Takes a Welding Course" (Feb. 20, page 108). Although I have not read the article, I saw it mentioned in the Letters to the Editors column of Mar. 26. I think it would be interesting.

William J. Houle
Planning Department
Wayne Iron Works
Wayne, Pa.

Automatic Man O.K.'s Story

Please send a reprint of the article, "Consider the Automatics" (June 18, page 152). I am an "automatic" man employed by the Lundberg Screw Products Co. of Lansing, Mich. This article will be beneficial to me in my work.

Harry M. Ver Planck
Route 1
Bath, Mich.

Worn-Out Guide Into Discard

Please send us your "Guide for Selecting Tool Steels and Carbides" (Mar. 12 insert). Our present copy is worn out.

Clayton Clake
General Manager
Dura-Hard Steel Treating Co.
Chicago

Teamwork Pays Off

Thank you for sending the reprint, "Teamwork Along the Ohio" (June 18, page 108). This article is of particular interest to us, and we would like ten additional copies.

Robert M. Wishart
Pittsburgh Metallurgical Co. Inc.
Niagara Falls, N. Y.

Specialist Seeks Information

Do you have additional information on the "Kanigen Process" used in bonding honeycomb structures? It was mentioned in an item, "Honeycomb Bond," in the Technical Outlook column of June 11 (page 111).

L. F. Grossman
Fabrication Specialist
Jet Engine Department
Aircraft Gas Turbine Division
General Electric Co.
Cincinnati

• *Write: Paul Talmuy, Manager-Kanigen Division, General American Transportation Corp., 135 S. LaSalle St., Chicago 3, Ill.*

THEY "SKIN" STEEL TUBES to put PEP in this DIESEL!

Courtesy: Van der Horst Corp. of America

This powerful diesel loses its pep when cylinder liners become excessively worn. Formerly, this reoccurring ailment called for reboring — an operation that reduced the liner wall and its mechanical strength. In time, costly castings had to be scrapped. Now — a unique application of Frasse tubing helps put them back in service . . . indefinitely! Here's how.

By means of a newly developed electrolytic bath, the bore of the worn liner is plated with a precise layer of pure iron etched from the surface of a steel tube. It is then restored to original size — ready for service again.

The success of this precision plating operation depends on quality tubing that is dimensionally uniform. Frasse tubing — from warehouse stock — has met this rigid requirement for many years *without a single rejection.*

There is no fear of non-uniformity when you work with Frasse tubing. You get the same trouble-free quality with every order. And, remember Frasse tubing specialists are available to consult with you in applying tubing to your product advantageously, or in solving a tube problem. Whenever you need tubing — you'll be pleased with the extra services you get — simply by calling Frasse.

Frasse for Tubing....

Seamless and Welded Mechanical Tubing
Pressure, Condenser and Hydraulic Tubes
Stainless Tubing, Seamless and Welded
Stainless Pipe, Valves and Fittings
Aluminum Tubing, Pipe and Fittings
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U.S.P. PATENTED STAINLESS STEEL PROCESS

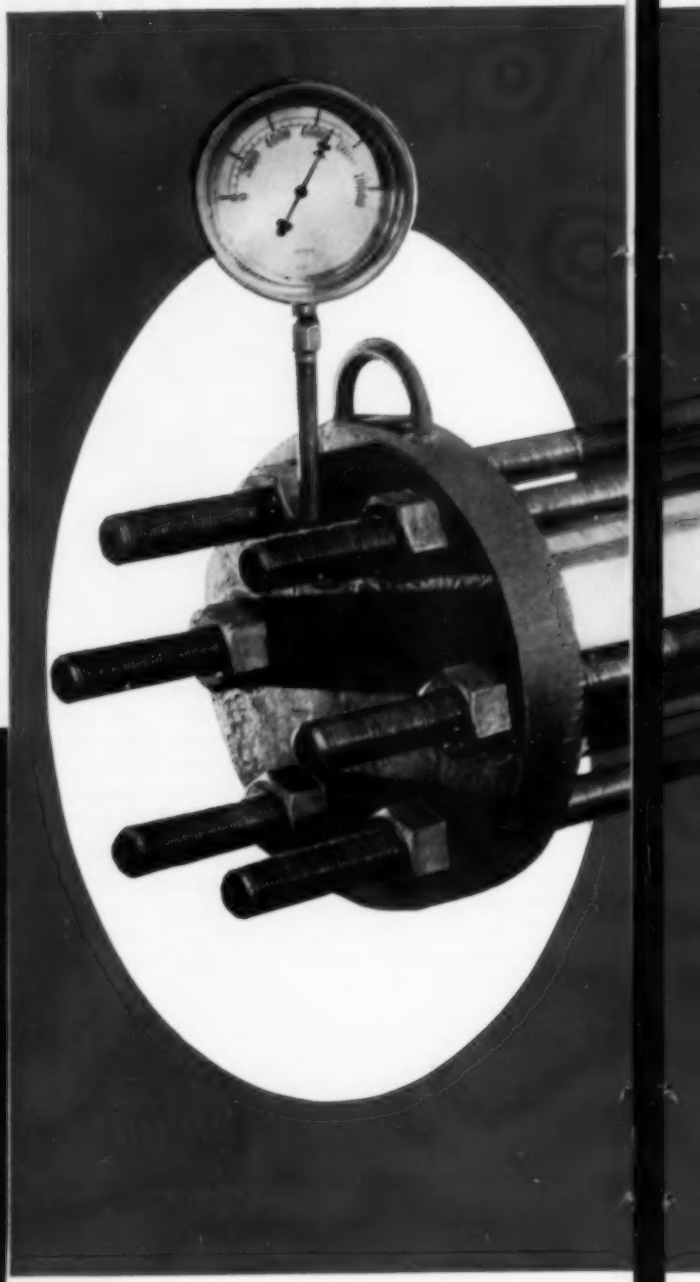
Centrifugally cast stainless steel pipe passes rigid specifications . . . including severe hydrostatic pressure test.

The men who design today's petrochemical plants, refineries or Atomic power plants are confronted with piping problems involving temperatures, pressures and corrosive conditions which only a few years ago would have been called impractical, if not impossible.

U. S. Pipe's Steel & Tubes Division recently completed a piping requirement for 700 feet of Type 316 Extra Low Carbon, columbium-bearing stainless for a large petrochemical plant, which is typical of the job metal mold centrifugally cast pipe is doing today under a patented manufacturing process with rigid Quality Control.

U. S. Pipe is headquarters for metal mold centrifugally cast alloy and stainless steel pressure pipe over a wide range of special and standard analyses — in large or small quantities.

Write and outline your stainless piping problems. We may be able to help.



UPPER: Hydrostatic test rig used to qualify each length of pipe.

LOWER: Turned and bored stainless pipe is dimensionally accurate and furnished with superior I.D. surfaces.

Note these exacting specifications on 316 Cb ELC Stainless Steel Pipe demanded by one of nation's leading oil companies:

Material Requirements: Pipe shall conform to ASTM Specification A-362-52T.

Chemical Analysis: Modified AISI Type 316 Cb (ELC), with *one percent* spread on chrome and nickel.

Finish: Each pipe to be turned, bored and faced to surface finish of 125 micro inch or better. O.D. tolerance plus 1/16" minus 0"; I.D. tolerance plus 0" minus 1/32". Pipe size: 12" O.D. x 1.17" wall.

Mechanical Tests: Tensile Tests—2 tests required on each pipe after heat treatment; one at room temperature, one at 700° F.

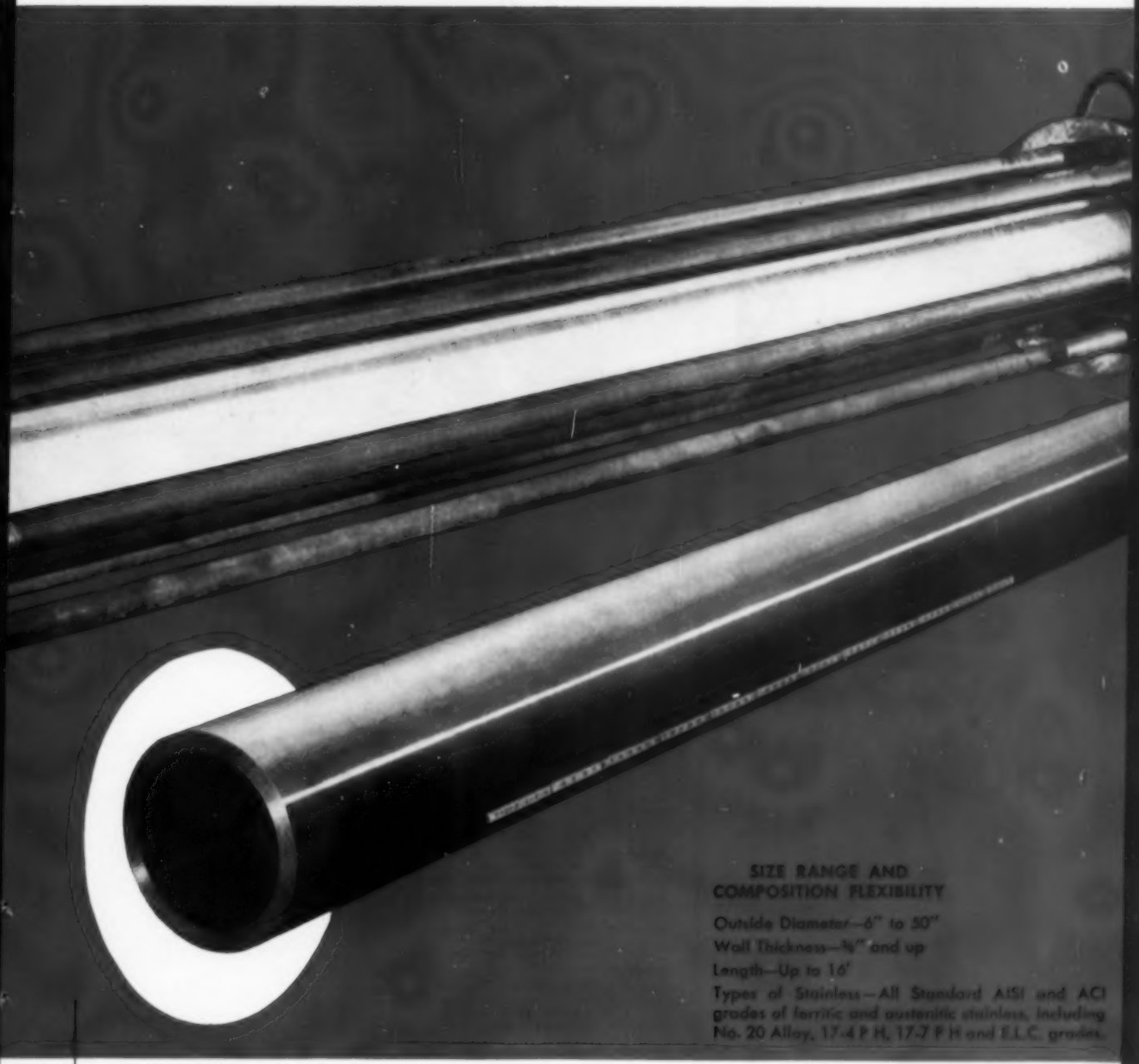
Inspection Requirements

1. Etching test on sections cut from each end of pipe.
2. Radiographic Inspection — Required complete circumferential coverage of at least an 8" wide section at each end of each pipe in accordance with ASTM Specification E71-52.
3. Fluid Penetrant — Entire O.D. and I.D. surface each piece.

Heat Treatment: Heat for 4 hours at 2100° F.—2150° F., water quench, follow by 5 hours at 1500° F.—1600° F. Cool in still air.

Hydrostatic Test: Each length tested to stress of either 90% of the minimum cold yield strength or a maximum pressure of 6800 psi — whichever is lower.

MEETS RIGID PIPING REQUIREMENTS



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Outside Diameter—6" to 50"
Wall Thickness—⅛" and up
Length—Up to 16'
Types of Stainless—All Standard AISI and ACI grades of ferritic and austenitic stainless, including No. 20 Alloy, 17-4 P H, 17-7 P H and E.L.C. grades.

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We couldn't begin to mention, in this limited space, all of the uses to which Diamond Perforated Metals are being applied today. In addition to the Sizing Screens and Ornamental Grilles, with which we started forty years ago, we now serve a great number of leading engineering and manufacturing organizations in such fast-moving fields as Air Conditioning, Atomic Energy, Aviation, Chemical Processing, Electronics, Noise Control, Smoke Abatement, etc.

To meet these widely diversified and constantly growing requirements we have developed hundreds of specialized tool arrangements which enable us to give superior service at competitive costs. Write for Catalog 39 and tell us about YOUR requirements. No charge or obligation for estimates and suggestions.

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17915 So. Figueroa St., Gardena, California

A GOOD LAW TO BREAK

The law of averages says that cancer will kill one out of every six Americans. But the law does not have to prevail. You can help break it in two ways. By having a thorough medical checkup every year . . . and by sending a contribution to your Unit of the American Cancer Society or to Cancer, c/o your town's Postmaster.

Fight cancer with a checkup and a check.

AMERICAN CANCER SOCIETY

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You, too, *pay* for the best spring steel . . . make sure you *get* it. Specify Roebling. John A. Roebling's Sons Corporation, Trenton 2, N. J.

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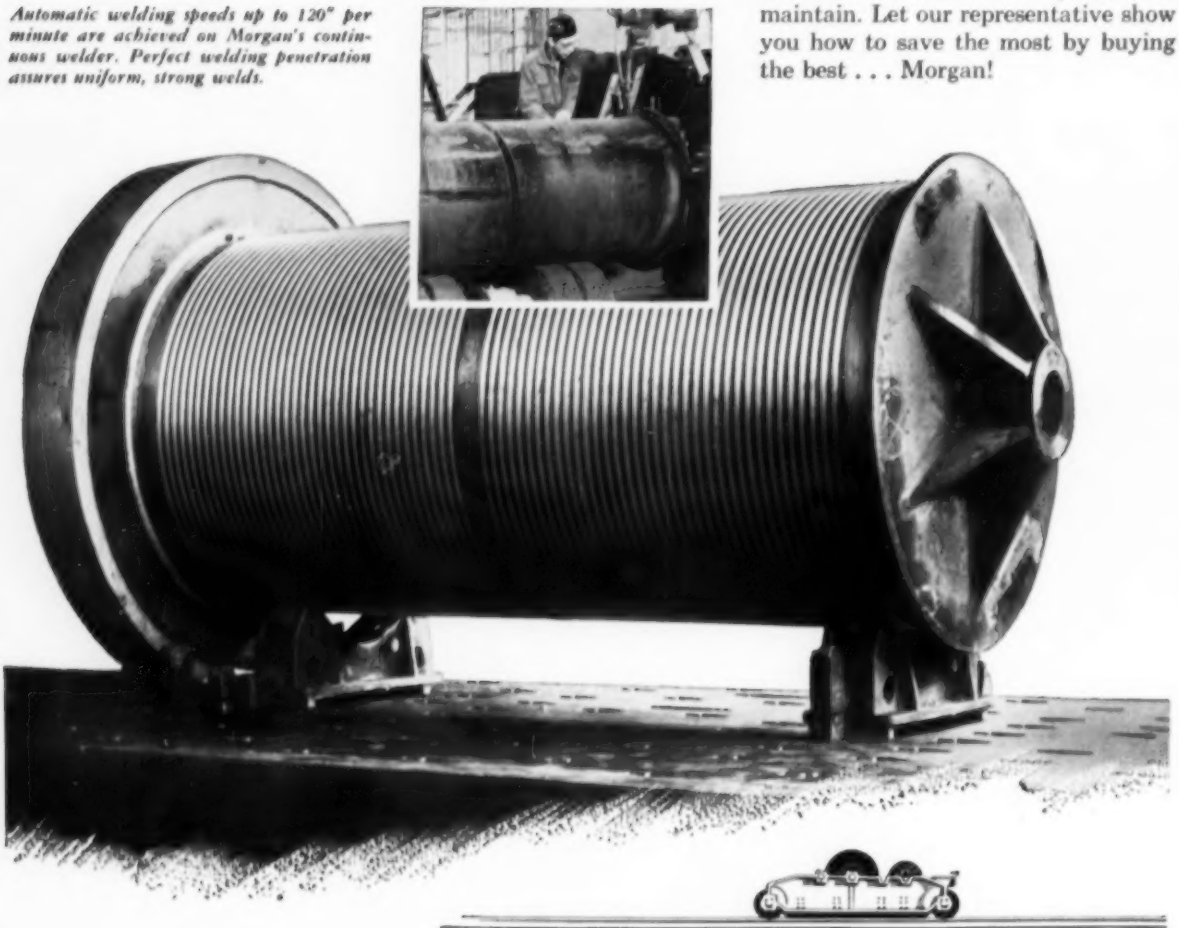
• *Fabricated drums* in Morgan cranes are structurally stronger than cast drums . . . yet they weigh less.

Automatic welding of Morgan drums with the world's largest continuous welding machine assures uniform, sound joints and seams.

Crane girders, too, are welded automatically, making them stronger and lighter. Morgan welders are qualified in accordance with A.S.M.E. and A.W.S. codes.

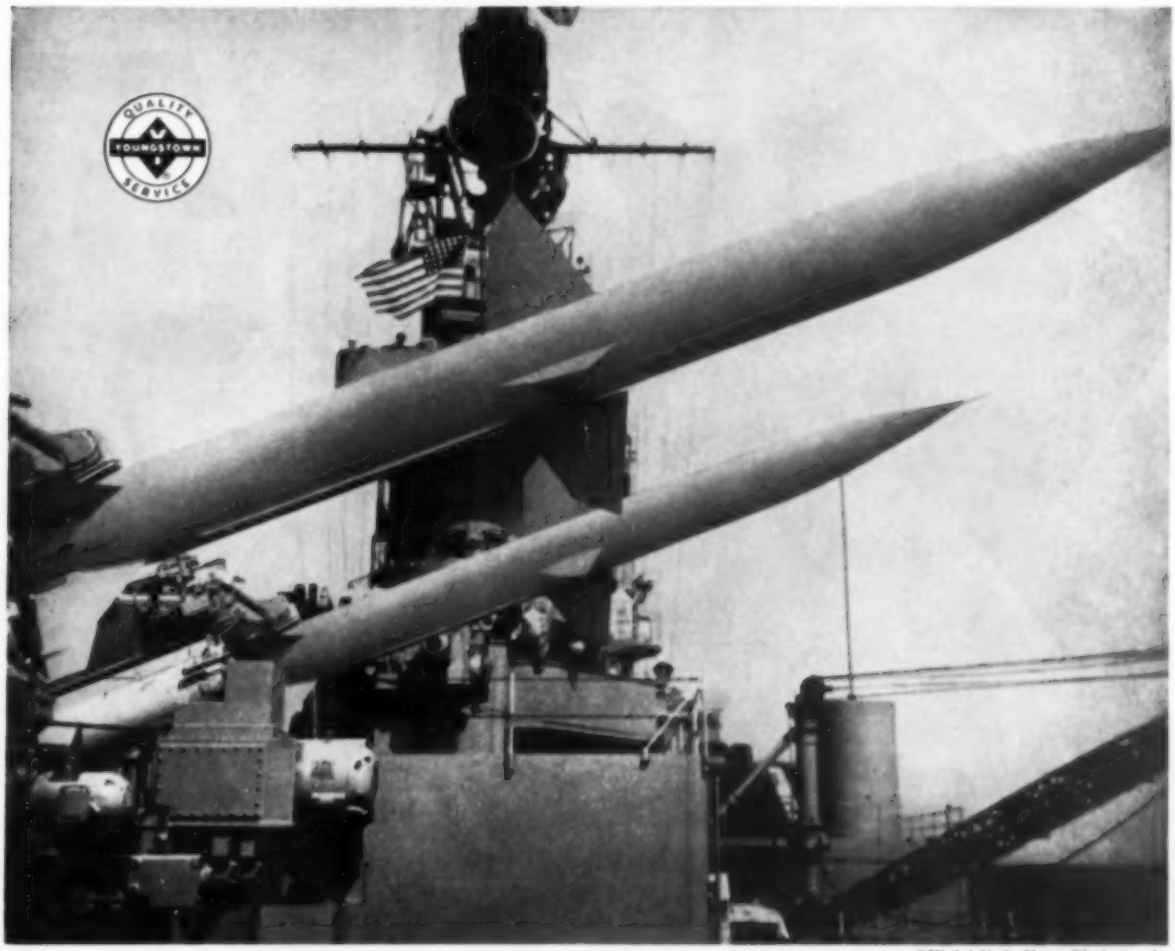
Performance records prove conclusively that Morgan cranes are the best in the business . . . cost less to operate and maintain. Let our representative show you how to save the most by buying the best . . . Morgan!

Automatic welding speeds up to 120" per minute are achieved on Morgan's continuous welder. Perfect welding penetration assures uniform, strong welds.



The Morgan Engineering Company, founded in 1868, manufactures overhead electric traveling cranes, gantry cranes, open hearth special cranes, plate mills, blooming mills, structural mills, shears, saws, and auxiliary equipment.

THE MORGAN ENGINEERING CO. *Alliance, Ohio*



Official U. S. Navy Photograph

Supersonic tracker of enemy planes

Now guarding our coast, U. S. Navy's new guided missile has vital parts of Youngstown Alloy Sheets

Combining metallurgical skills of steelmaking with modern marvels of electronics, Terrier Guided Missiles are capable of destroying hostile targets at long range with great accuracy. The Youngstown Sheet and Tube Company is proud of participating in the production of high quality steel used in these new weapons for our naval forces.

The booster and sustaining mechanism of the Terrier are fabricated of Youngstown Aircraft Quality Alloy Steel Sheets **by the Hicks Corporation.**

Youngstown Alloy Steels are produced in a variety of forms and qualities to meet customers' specifications. Every ton is subject to a close quality control which insures uniform chemical composition and mechanical properties.

Whenever you have requirements for steel, consider Youngstown Carbon Alloy or Yoloy—sheets, bars, plates or pipe.

Youngstown

THE YOUNGSTOWN SHEET AND TUBE COMPANY

Manufacturers of Carbon, Alloy and Yoloy Steel

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Here's why

"THE

Men in 1

that's your MFD*

He's a TAP man
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He's a CUTTER man
He's a REAMER man
He's a CARBIDE man
He's a Complete tool man

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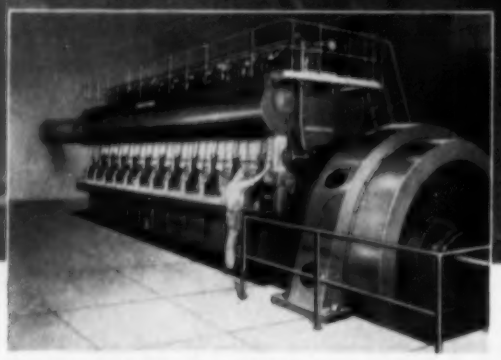
Warehouses in New York, Chicago, Detroit, Dallas, San Francisco • Buy tools by phone from your Morse-Franchised Distributor and save ordering time

MORSE means MOST" in Cutting Tools



The crankshaft harnesses 6190 horsepower developed by this Nordberg 12 cylinder Diesel engine to generate 4840 gross kilowatts of electric power.

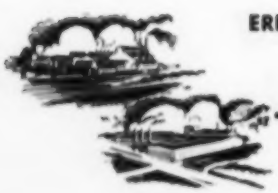
Forging Weight 108,460 Pounds
Finished 12 Throw Crankshaft
46,400 Pounds

FROM a giant 210,000 pound, 72 inch ingot, poured at Erie Forge & Steel, came this 12 throw crankshaft . . . the largest ever made.

Within our plant this giant was machined down to 46,400 pounds fighting weight; the finished crankshaft is 43 feet 9 inches long by 15½ inches journal diameter. Bearing surfaces are polished to a mirror finish.

It is one of many such forgings followed step by step from raw material to shipping dock within the Erie Forge & Steel Corporation's plants.

Another convincing proof of the way "One Responsibility and One Control" at Erie Forge & Steel can work for you to your specifications for steel forgings and castings.



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FIVE YEARS
OF BASIC RESEARCH ASSURES—
LONG LIFE
FASTER CUTTING
HEAVY PRESSURES
FOR USERS *of*

PENINSULAR'S NEW "3Z" SNAGGING WHEEL

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1952
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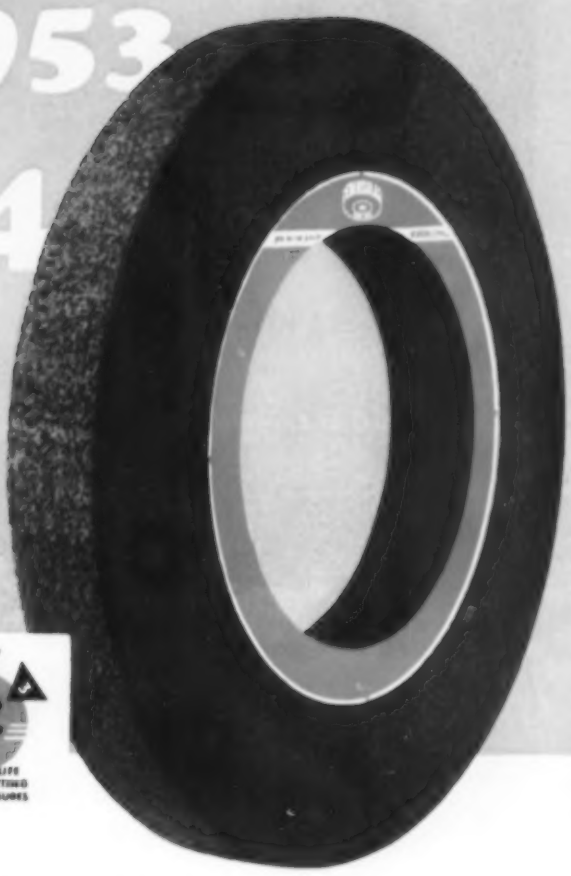


FOR SLAB GRINDING

The new "3Z" combination of denser structure and faster, easier-cutting abrasive grains creates unusual opportunities to speed up grinding of slabs. The "3Z" Wheel lasts much longer on rough, wide area work, cuts costs and schedules at the same time.

FOR BILLET GRINDING

Peninsular's near-zero porosity makes available a wheel whose special abrasive grains stand up under the sudden shocks of billet grinding. The New "3Z" Wheel is an easier-handling unit that eliminates worker fatigue. It is smooth-running and easily controlled.

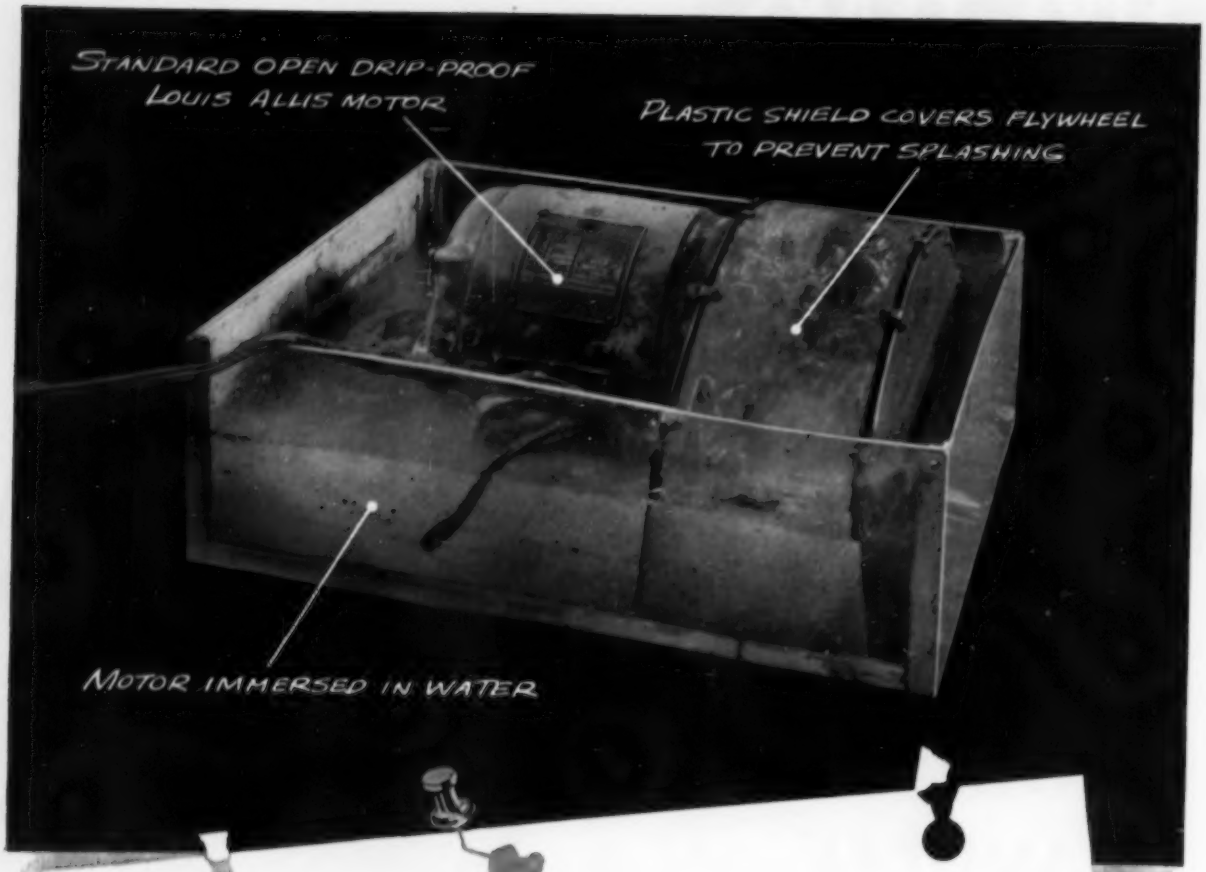
FOR HEAVY PRESSURES

The New "3Z" Wheel holds its own against the demands of mechanical snagging and other heavy duty grinding. In spite of its rugged, compact grain, "3Z" acts like a much softer wheel because of the unusual characteristics of its new type bond.

PENINSULAR

GRINDING WHEELS

PENINSULAR GRINDING WHEEL DIVISION—ABRASIVE AND METAL PRODUCTS COMPANY—DETROIT, MICHIGAN



In water 1½ years...still running

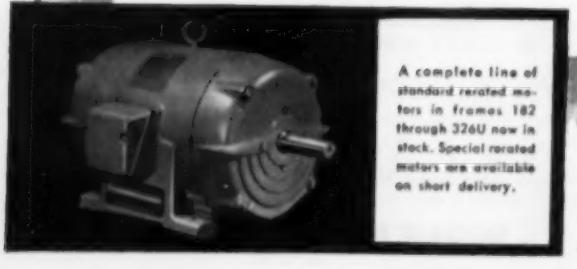
Dramatic proof that Louis Allis motor insulation provides unusual moisture resistance

We wouldn't do this to a motor. But somebody did, to check our new insulation. They took a standard open drip-proof motor, placed it in water up to the shaft, and ran it a year and a half.

The motor will still run, too, which proves that our insulating materials are of top quality. One of our exclusive features is the new phenolic impregnating varnish we use. As you can see, this varnish resists moisture, but it also has excellent thermal and chemical resistance and is not susceptible to embrittlement.

Insulation usually determines the life of a motor. That's why the insulating materials used in the new L. A. line are the product of years of continuous research and development. That's why Louis Allis motors run longer . . . give less trouble.

Find out the many other advantages available to you in the new L. A. line of motors. Write for our new bulletin No. 1700.



A complete line of standard rerated motors in frames 182 through 326U now in stock. Special rerated motors are available on short delivery.

LA-107

THE LOUIS ALLIS CO.
MILWAUKEE 7, WISCONSIN

CALENDAR
OF MEETINGS

July 19-20, Truck-Trailer Manufacturers Association Inc.: Summer meeting, Edgewater Beach hotel, Chicago. Association's address: 710 Albee Bldg., Washington 5, D. C. Managing director: John B. Huise.

July 25-28, National Tool & Die Manufacturers Association: Summer meeting, Stanley hotel, Estes Park, Colo. Association's address: 907 Public Square Bldg., Cleveland 13, O. Executive secretary: George S. Eaton.

Aug. 6-8, Society of Automotive Engineers Inc.: National west coast meeting, Mark Hopkins hotel, San Francisco. Society's address: 29 W. 39th St., New York 18, N. Y. Secretary: John A. C. Warner.

Aug. 7-8, National Screw Machine Products Association: National sales conference, Wade Park Manor hotel, Cleveland. Association's address: 2860 E. 130th St., Cleveland 20, O. Executive vice president: Orrin B. Werntz.

Aug. 21-24, Western Electronic Show and Convention: Pan Pacific Auditorium and Ambassador hotel, Los Angeles. Information: WESCON, 344 N. LaBrea Ave., Los Angeles 36, Calif.

Sept. 7-9, Metal Powder Association: Fall meeting, Homestead, Hot Springs, Va. Association's address: 420 Lexington Ave., New York 17, N. Y. Secretary: Robert L. Ziegfeld.

Sept. 9-12, American Institute of Chemical Engineers: Fall meeting, William Penn hotel, Pittsburgh. Institute's address: 120 E. 41st St., New York 17, N. Y. Secretary: F. J. Van Antwerpen.

Sept. 9-12, National Metal Trades Association: Eastern plant management conference, Essex-Sussex hotel, Spring Lake, N. J. Association's address: 122 S. Michigan Ave., Chicago 3, Ill. Secretary: Charles L. Blatchford.

Sept. 10-12, Allied Railway Supply Association: Annual meeting, Sherman hotel, Chicago. Association's address: 1200 W. Chase Ave., Chicago 26, Ill. Executive secretary: Charles F. Weil.

Sept. 10-12, Packaging Institute: Annual forum, Hotel Statler, Cleveland. Institute's address: 343 Madison Ave., New York 17, N. Y. Executive director: Charles A. Feld.

Sept. 10-13, Society of Automotive Engineers Inc.: National tractor meeting and production forum, Hotel Schroeder, Milwaukee. Society's address: 29 W. 39th St., New York 18, N. Y. Secretary: John A. C. Warner.

Sept. 11-13, American Die Casting Institute: Annual meeting, Edgewater Beach hotel, Chicago. Institute's address: 366 Madison Ave., New York 17, N. Y. Secretary: David Laine.

Sept. 11-14, Packaging Machinery Manufacturers Institute: Packaging machinery and materials exposition, Public Auditorium, Cleveland. Information: Hanson & Shea Inc., One Gateway Center, Pittsburgh 22, Pa.

Sept. 13-14, Porcelain Enamel Institute: Annual meeting, Broadmoor hotel, Colorado Springs, Colo. Institute's address: 1145 19th St. N. W., Washington 6, D. C. Secretary: John C. Oliver.

Sept. 16-20, American Society of Sanitary Engineering: Annual meeting, Morrison hotel, Chicago. Society's address: 4716 Ewing Ave. S., Minneapolis. Secretary: Walter A. Dunn.

Sept. 16-21, American Chemical Society: Annual meeting, Convention Hall, Atlantic City, N. J. Society's address: 1155 16th St. N. W., Washington 6, D. C. Executive secretary: Alden H. Emery.

Sept. 16-22, American Society for Testing Materials: Pacific area national meeting and apparatus exhibit, Hotel Statler, Los Angeles. Society's address: 1916 Race St., Philadelphia 3, Pa. Executive secretary: Robert J. Painter.

Rx for casting headaches*

Finding the proper castings often causes headaches for the purchasing, production and design men. Many have found the remedy in HAMILTON QUALITY CASTINGS.®

There are differences between foundries, and the differences can be important to you. Hamilton Foundry excels in the problem jobs . . . in castings that are hard to make because of intricate coring, thin metal sections, tight dimensional tolerances or high physical specifications. We take these jobs and consistently "make them right" . . . on time.

Our specialties are light and medium castings in Gray Iron, Alloyed Iron, Meehanite, Ni-Resist and Ni-Hard.

Why not let us relieve your casting headaches?

A 'phone call or letter will bring prompt assistance. Better still, send us the drawing with casting weight and a description of the pattern equipment. We'll be glad to prescribe for that "casting headache"

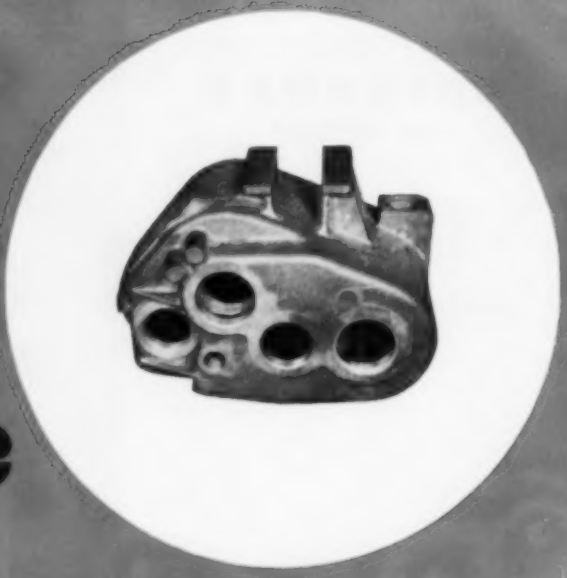
P.S. The above "headache casting", a pump body, was made in Meehanite; casting weight 3.87 lbs. Cored passages and sections ranging from 1/32" to 2 1/16" made this casting a tough one.

GRAY IRON • ALLOYED IRON
MEEHANITE • NI-RESIST • NI-HARD

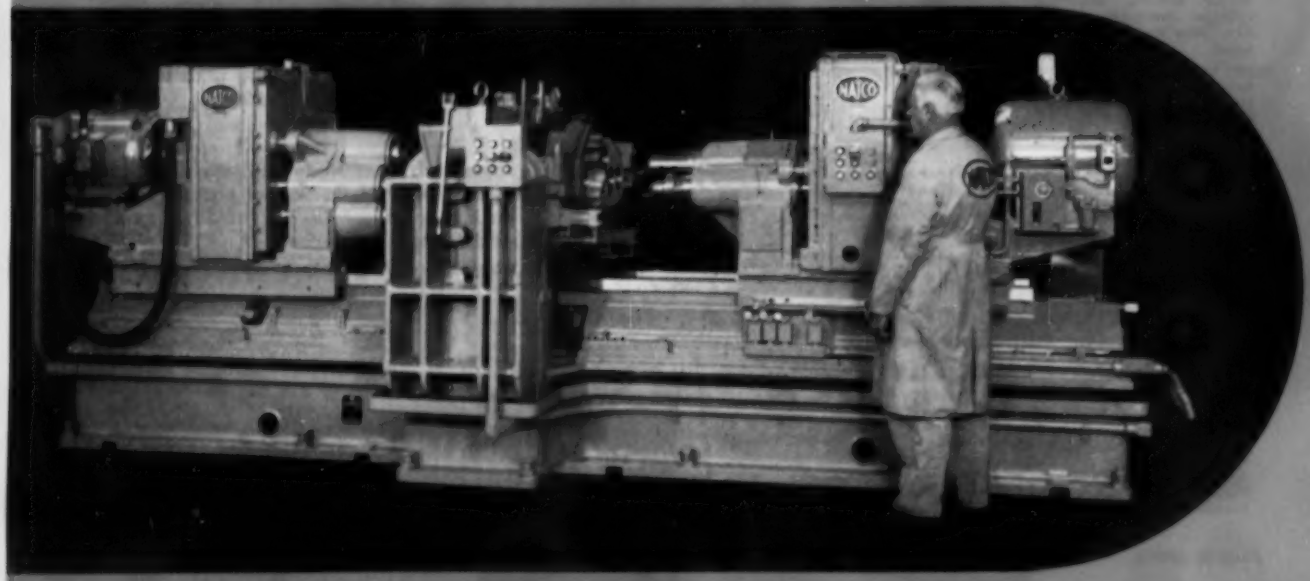
THE HAMILTON FOUNDRY
AND MACHINE CO.
1551 Lincoln Avenue • Hamilton, Ohio
Phone TWinbrook 5-7491

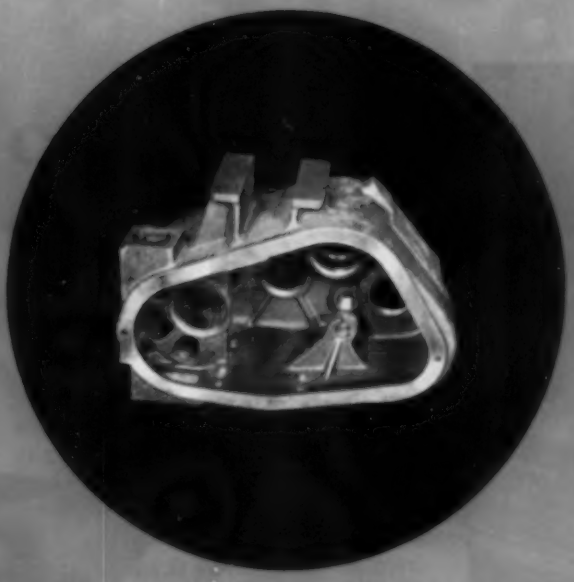
MSG-2

Natco® Automatic Matches Boring Mill Accuracy



and quickly converts for five different jobs





This Natco two-way machine stepped in where automatics "fear to tread!" It replaced a precision boring mill, speeded production and didn't give up a tenth in accuracy! At The Frank G. Hough Co. boring mills were used for exacting tolerances on transmission parts for the Hough Payloader®. Higher production was desired.

Now with a Natco two-way automatic, Hough is getting production rates—not job shop rates. The Natco bores diameters to within .0005"—square with mounting face within .0005" per inch bore length. The machine also chamfers, counterbores and notches boss contours.

Versatile too! Hough processes five different transmission housings or covers with a single machine. After a typical production run averaging 100 parts, the machine is quickly converted to another job.

Ask for information about the PAYD (Pay-As-You-Depreciate) Finance Plan.

National Automatic Tool Company, Inc. *Richmond, Indiana*

Multiple-spindle drilling, boring, facing and tapping machines. Special machines for automatic production.

Call Natco offices in Chicago, Detroit, Buffalo, New York, Boston, Philadelphia, Cleveland and Los Angeles; distributors in other cities.

NATCO

Notes from Natco...

Middle Age Spread

Having reached the age of 55 feeling as spry as the day we started, we at Natco are going to spread out. The demand for our products makes this necessary since we're anxious to give our customers the kind of deliveries they need.

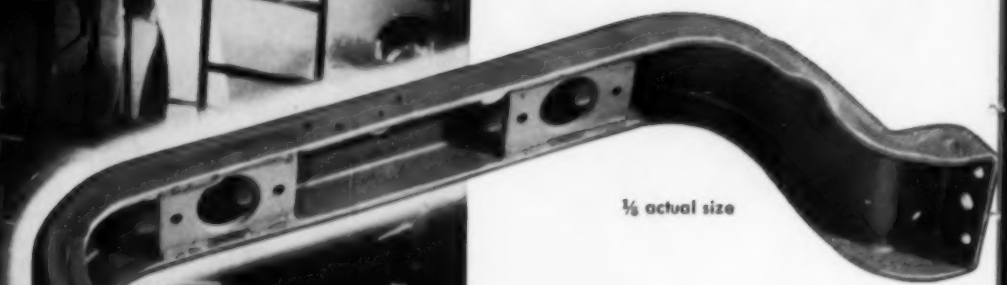
After Jan. 1, 1957, when the job is finished, we'll have eight acres under one roof at our Richmond, Indiana plant. We figure it will increase our production capacity about 50%.

To take care of the increased need for Sales Service, we've already increased our staff about 50% and provided them with new efficient quarters.

Appreciating Depreciation

Depreciation, we've come to realize, is one of the least understood and most important aspects of the business picture today. Though we're far from experts on the ins and outs of this complex subject, we've undertaken to discuss the importance of looking at depreciation realistically in our current FORTUNE campaign. We'll be happy to send you reprints if you'll drop us a line.

Use Republic's BETTER



⅛ actual size

Actual size

SIZE RANGE OF STAMPINGS produced by Republic's Pressed Steel Division contract facilities is indicated by truck cross member engine support and window sweep lock shown above. In addition to stampings, we can complete your parts or products requiring the following operations: gas, arc, spot, projection, seam, stitch, butt and submerged arc welding; controlled atmosphere, conveyor-type copper brazing; rotary hearth and conveyor-type annealing; machining, including drilling, tapping, milling and turning; spray or dip painting, 3-color lithographing plus infra-red or gas drying; hot dip galvanizing; hot, press, spinning or semi-tubular riveting.

REPUBLIC

REPUBLIC STEEL

World's Widest Range of Standard Steels

Contract Facilities to Produce

STAMPINGS, FASTER...AT LESS COST

When you turn your stamping requirements over to our Pressed Steel Division, a wealth of design, engineering and fabricating experience backed by a wide variety of high-volume equipment is immediately applied to the problem. The result is a top-quality stamping, mass-produced to your specifications at lowest possible cost.

For example, king-sized stampings in the heaviest gages used in any industry are easily produced on batteries of the finest large-tonnage pressroom equipment. Or we can handle small-piece stamping contracts on special high-speed presses designed to minimize cost per unit. In addition, our tool and die shop is equipped with modern machine tools and staffed with expert tool and die makers—assurance that your stampings are produced on top-quality dies, maintained by the men who build them.

Beyond production of stampings alone, we can fabricate and finish components, sub assemblies or complete products for you. Such operations include welding, brazing, riveting, machining, annealing, galvanizing and painting.

No other single source can supply as wide a range of stamping facilities and allied services. From the moment your job is placed in our shop, we assume complete responsibility from material to shipping. Savings in handling, inventories, labor and overhead are reflected in reduced unit cost to you. For further information, contact your local Republic Office. Or mail the coupon for booklet ADV 681, today.

SPEED SPECIAL PARTS PRODUCTION of headed or threaded items by taking advantage of our Bolt and Chain Division's facilities. Here, your requirement is analyzed and your order produced by design and manufacturing specialists backed by more than a century of experience in developing fast and efficient production techniques.

YOU CAN CUT COSTS of small parts like these ratchet wrench dogs by ordering your material in the form of Republic Cold Drawn Special Sections. You save time and money by not buying excess metal and machining it away. Cold drawing produces a fine surface and improves the physical properties of the steel.

FASTER PRODUCTION OF COMPLEX PARTS is possible in many cases when you fabricate with Republic Iron Power. Difficult-to-machine surfaces can be built right into the part to eliminate or minimize finishing operations. In addition, uniform characteristics of Republic Iron Powder promote uniform quality in your production. Send coupon for facts.

STEEL

and Steel Products

REPUBLIC STEEL CORPORATION
Dept. C-2030
3120 East 45th Street, Cleveland 27, Ohio

☐ Please send me your Stamping Booklet, ADV 681

I would like further information on:

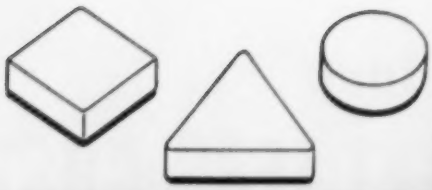
☐ Cold Drawn Special Sections ☐ Iron Powder
☐ Bolt and Chain Division Contract Manufacturing Facilities.

Name_____ Title_____

Company_____

Address_____

City_____ Zone____ State_____



CARMET

CA-610 THROW-AWAY TOOL BLANKS improved this cutting operation 150%

A leading West Coast manufacturer of aircraft parts now uses Carmet CA-610 tool blanks for machining components of jet engines and gas turbines. Since switching to this special steel-cutting carbide grade, production has sharply increased from 28 parts per blank *to more than 80.*

Carmet throw-away blanks are designed for any type of tool holder. This same manufacturer reports that the ease and speed with which used blanks may be exchanged for new ones has reduced downtime for tool change-over by 7%.

Advantages such as these are as important in your industry as they are in aircraft production. Call your Carmet dealer TODAY for his advice on any production problems you may have . . . or write *Allegheny Ludlum Steel Corporation, Carmet Division, Detroit 20, Mich.*

Write for your copy:
CARMET CATALOG

Latest edition . . . 32 well-illustrated pages, containing data on all Carmet grades, and on Carmet blanks, tools, die sections, etc.; also special preforming to order.

Write for your copy:
ADDRESS DEPT. S-79

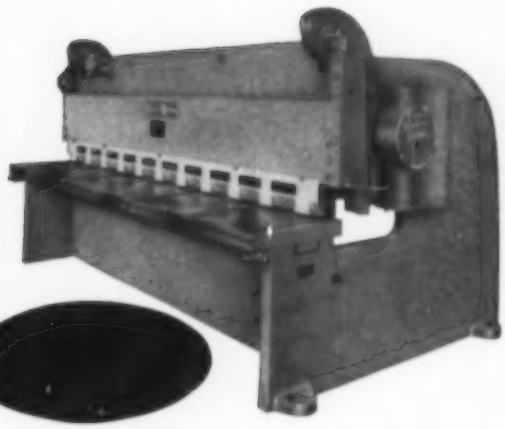
For ALL your CARBIDE needs, call

Allegheny Ludlum

AL CARMET CARBIDES

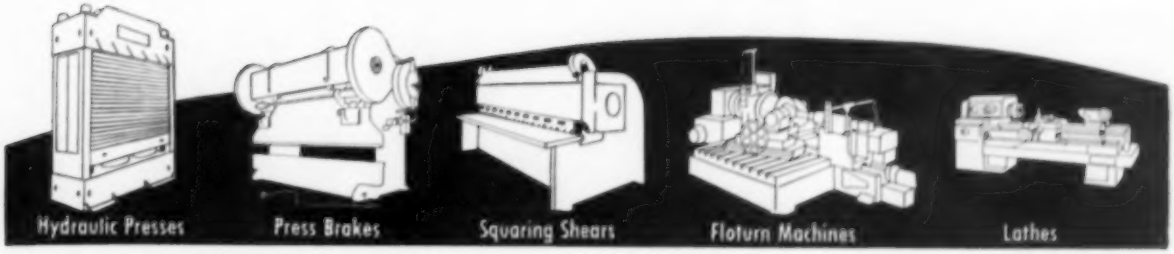
Branch Offices or Distributors in Principal Cities WSW 6060

keep your
shear operators in the
production zone

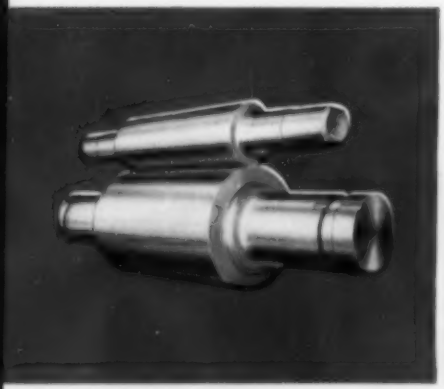


WITH A LODGE & SHIPLEY POWER SQUARING SHEAR

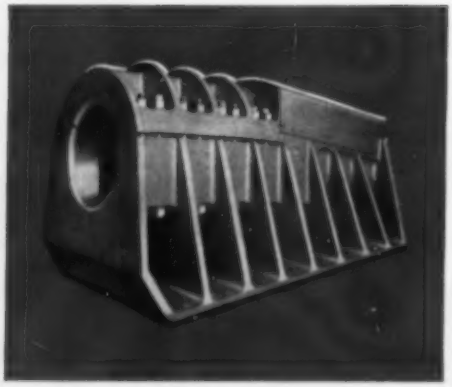
There's one thing for sure about shearing.
Keep the operator out front for maximum production!
That's why one user calls the space in front of his Lodge & Shipley Shear the "Production Zone." With all adjustments in front and all clear behind the shear, the operator stays out front and on top of the shearing job. Necessary adjustments can be made quickly . . . scrap or cut pieces can be removed from the back of the shear by hand, truck or even conveyor.
There are, of course, many other productioneered features in the New Lodge & Shipley Shears. For details, write for Bulletin PS-8:
The Lodge & Shipley Co., 3070 Colerain Ave., Cincinnati 25, Ohio



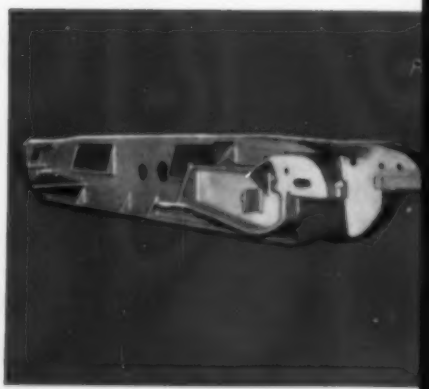
CONTINENTAL 26" x 49" x 66", 4-high reversing hot strip mill in the Newport Steel Corporation Plant, Newport, Kentucky.



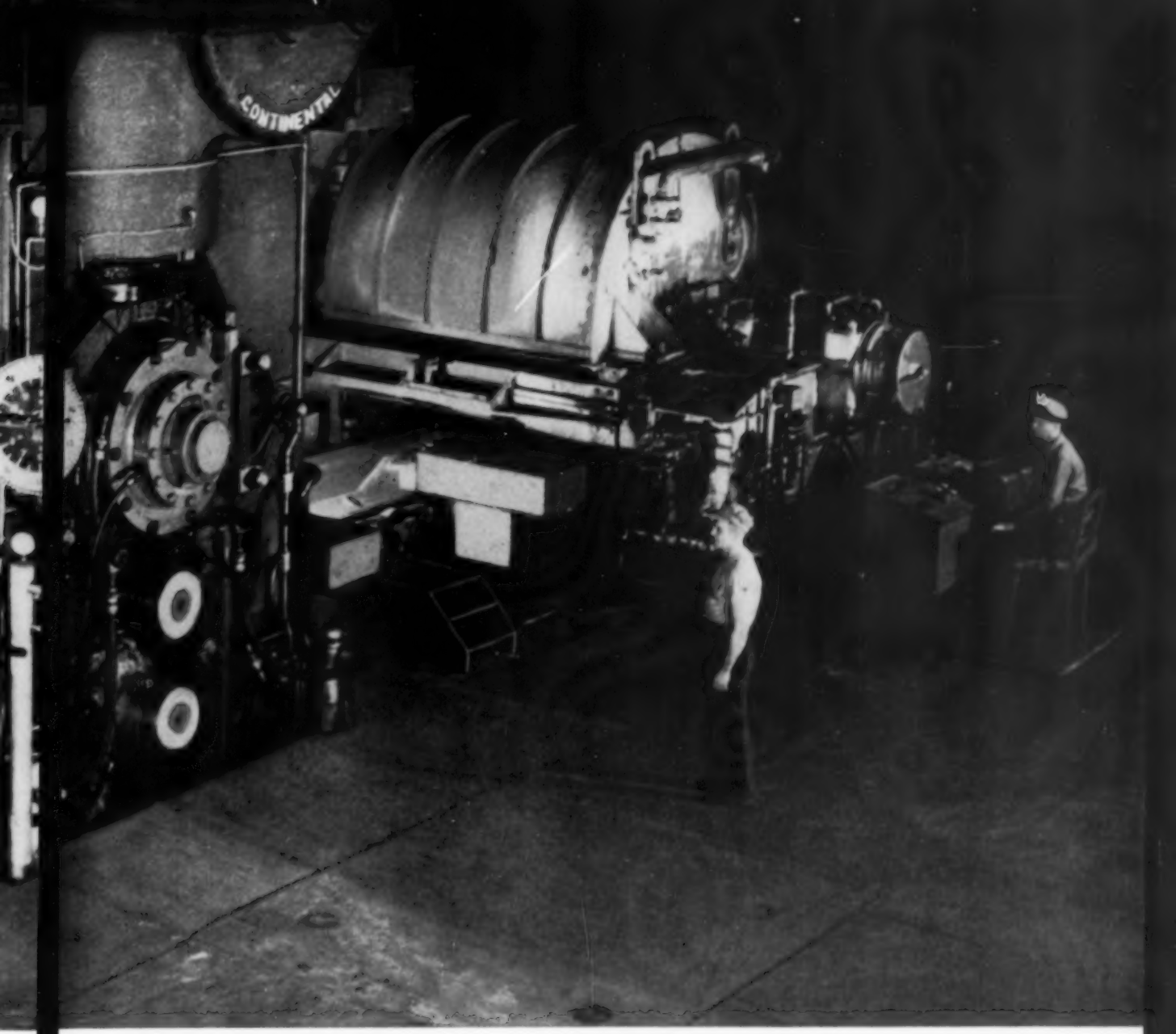
ROLLS—iron, alloy iron and steel rolls for all types of rolling mills.



CASTINGS—carbon and alloy steel castings from 20 to 250,000 pounds.



WELDMENTS—fabricated steel plate, or cast-weld design.



BLAW-KNOX makes what it takes

to roll precision-gage hot strip directly from ingots

Precision-gage hot strip is rolled directly from ingots by this modern CONTINENTAL 66-inch 4-high reversing hot strip mill in the Newport Steel Plant at Newport, Kentucky.

A full range of gages and analyses, including carbon and special grades of steel, are rolled by this 26" x 49" x 66" mill. The mill was designed to incorporate an existing 4000 hp. d.c. reversing motor through a pinion stand.

Blaw-Knox designs and builds *complete* rolling mill installations—assumes undivided responsibility from preliminary engineering to satisfactory operation. At any time we'll be glad to discuss your plans with you.

BLAW-KNOX COMPANY
Foundry and Mill Machinery Division
Blaw-Knox Building • 300 Sixth Avenue
Pittsburgh 22, Pennsylvania

Complete Rolling Mill Installations . . . including all auxiliary equipment . . . for ferrous and non-ferrous metals

Hot strip mills • cold strip mills • slabbing mills • temper mills • universal mills • plate mills • blooming mills • structural mills • rail mills • billet mills • rod mills • merchant mills • roll lathes • chippers • special machinery • and complete auxiliary equipment.

50th Anniversary
BLAW-KNOX
1906-1956

CONTINENTAL

KENNAMETAL

K7H

has a definite place in your operations

- for high-velocity machining
- for cutting heat-treated steels
- for cutting high tensile steels

Kennametal* Grade K7H is being selected by shop after shop for high-velocity cutting operations . . . chiefly because of these desirable cutting edge characteristics: High hardness (93.5 Rockwell A) combined with phenomenal strength (three times that of nonmetallics); exceptional wear resistance and maximum resistance to cratering; excellent retention of strength even at high temperatures; and top resistance to shock.

Use Kendex Tooling with turn-over inserts (available in 17 styles and over 200 tools) . . . for lowest cost per cutting edge.

HERE ARE EXAMPLES OF K7H PERFORMANCE

Doubles production: Cutting 1½" wide stators of welded laminations of 2% silicon steel, K7H has out-performed all other cutting edges by better than two to one, with 147 pieces averaged per index for K7H against only 65 pieces per index with the best competitive carbides. *Conditions:* 900 sfm, .0083" feed, and .015" depth of cut. *Results:* Higher total production at end of day, with less machine down time, less scrap, better quality by holding tolerances, and lower tooling cost per stator ($0.00109).

Outperforms ceramics by more than 30 to one in test boring SAE 1020 steel, flash hardened, length of bore 1¼", depth .025" at 900 sfm. Grade K7H cut 67 pieces while ceramics only cut two (ceramics chipped). *Result:* K7H ordered for the operation.

K7H cuts 252 pieces as compared to 30 . . . the best record for a competitive carbide in facing cut to dead center of SAE 1018 steel 5" O.D. gear blank, at 1000 sfm (at outer edge) and .008" depth of cut. *Result:* Standardized on K7H.

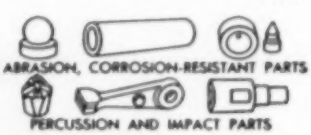
Performance 3 times greater than with competitive carbide cutting cast steel stator housing with six interruptions at 700 sfm, .014" feed, and ⅛" depth of cut. *Result:* K7H was selected for the job.

Why not discuss your machining problems with a Kennametal tool engineer. He will help you take full advantage of this remarkable cutting grade. Call him or write KENNAMETAL INC., Latrobe, Pa.

*Registered Trademark

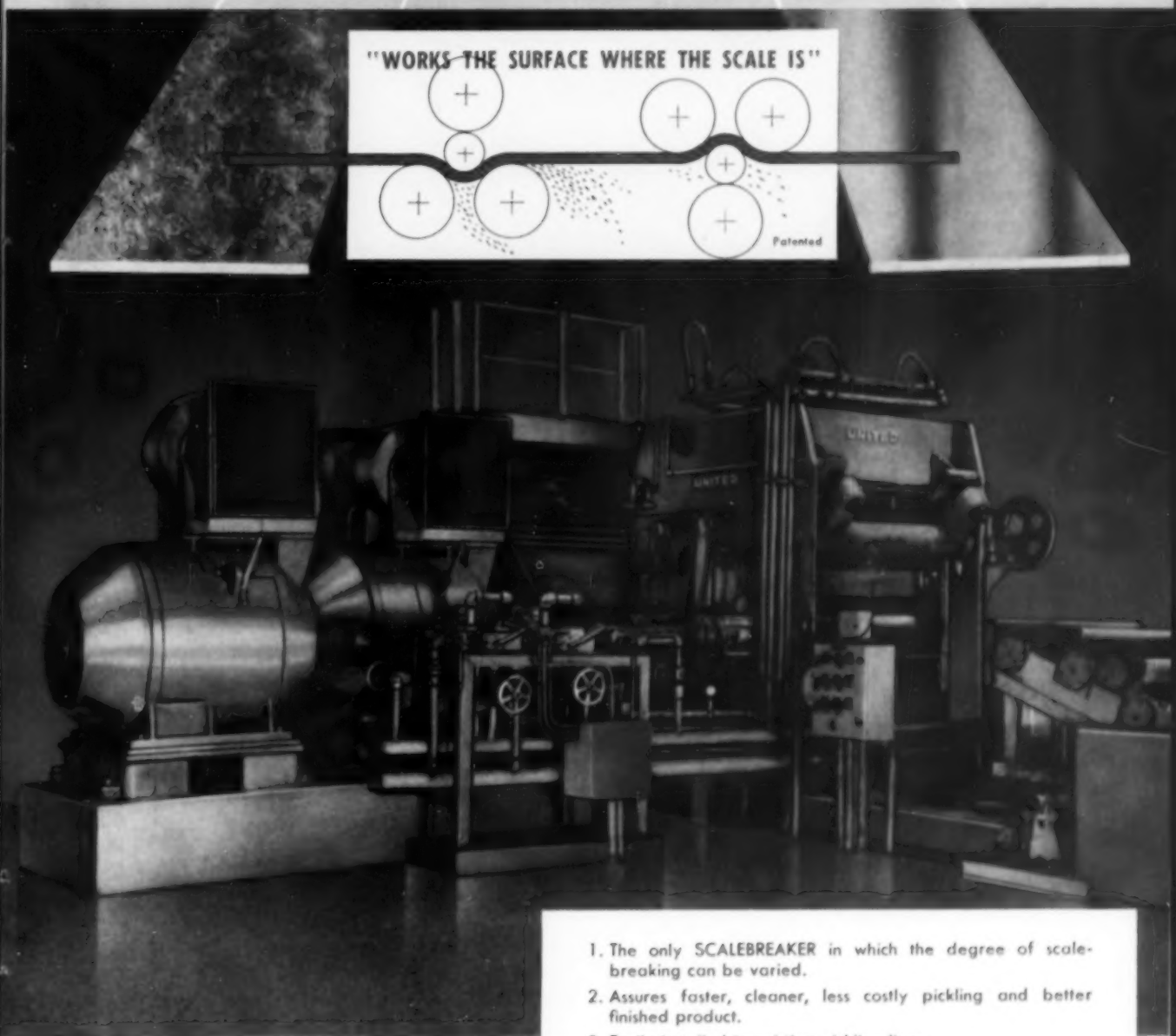
B-5087

INDUSTRY AND
KENNAMETAL
...Partners in Progress



UNITED®

NEW *Strip Processing* SCALEBREAKER



1. The only SCALEBREAKER in which the degree of scale-breaking can be varied.
2. Assures faster, cleaner, less costly pickling and better finished product.
3. Easily installed in existing pickling lines.

Write today for complete engineering data.

UNITED ENGINEERING AND FOUNDRY COMPANY

PITTSBURGH, PENNSYLVANIA

Plants at: Pittsburgh • Vandergrift • Youngstown • Canton • Wilmington (Labdell United Division)

Subsidiaries: Adamson United Company, Akron, Ohio
Stedman Foundry and Machine Company, Inc., Aurora, Indiana

Designers and Builders of Ferrous and Nonferrous Rolling Mills, Mill Rolls, Auxiliary Mill and Processing Equipment, Presses and other heavy machinery. Manufacturers of Iron, Nodular Iron and Steel Castings and Weldments.

got a problem?

If it's a *special steel* problem, let Crucible solve it for you quickly. Experienced Crucible sales engineers are always available to help with problems of selection or fabrication. And all Crucible warehouses are geared to supply the steels you need when you need them.

You can depend on Crucible – *big enough to serve you, small enough to want to.*

Stocks maintained of:

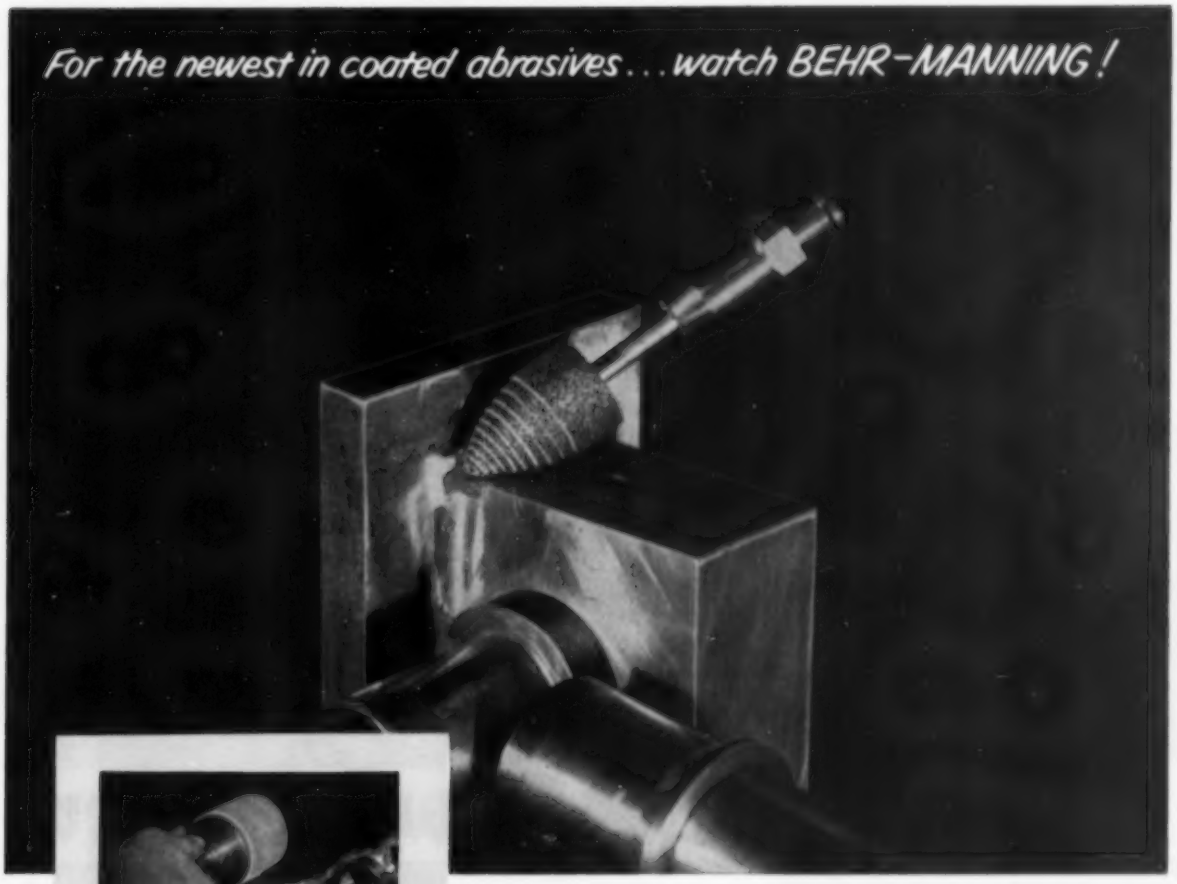
Rex High Speed Steel . . . ALL grades of Tool Steel (including Die Casting Die and Plastic Mold Steel, Drill Rod, Tool Bits, and Hollow Tool Steel Bars) ...Stainless Steel (Sheets, Bars, Wire, Billets, Electrodes) . . . Max-el, HY-Tuf, AISI Alloy . . . Onyx Spring, Hollow Drill Steel and other special purpose steels.

CRUCIBLE WAREHOUSE SERVICE

Crucible Steel Company of America

General Sales Offices, The Oliver Building, Mellon Square, Pittsburgh 22, Pa. Branch Offices and Warehouses: Atlanta • Baltimore • Boston • Buffalo • Charlotte Chicago • Cincinnati • Cleveland • Dallas • Dayton • Denver • Detroit • Harrison • Indianapolis • Los Angeles • Milwaukee • New Haven • New York Philadelphia • Pittsburgh • Portland, Ore. • Providence • Rockford • San Francisco • Seattle • Springfield, Mass. • St. Louis • St. Paul • Syracuse • Toronto, Ont.

For the newest in coated abrasives . . . watch BEHR-MANNING !



ABRASIVE BANDS are just the thing for smoothing concave areas and raw edges.

SLOTTED DISCS get to inside walls and do a fast, even polishing job.

ABRASIVE PENCILS produce a neat radius on inside flanges and edges like this one.

Fast, easy way to polish hard-to-get-at surfaces

BEHR-MANNING METALITE Abrasive Specialties in numerous sizes, shapes and grits can reach just about anywhere — die and mold channels, edges, corners, etc. When chucked into high speed power tools, these "abrasive tools" make deburring, shaping and polishing an efficient, fully mechanized production operation. *Production Digest*, a 64-page bulletin on modern grinding and polishing techniques, gives complete information. For a free copy, write Behr-Manning, Troy, N. Y., Dept. S-7.

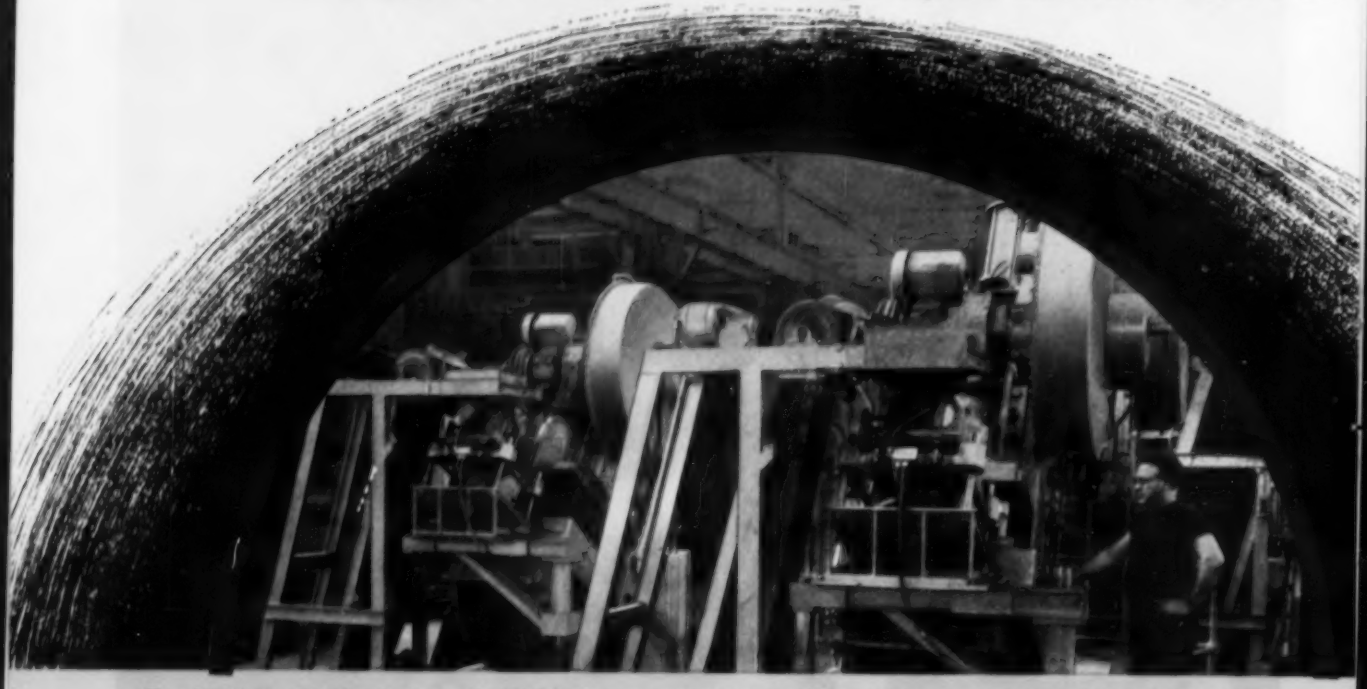
In Canada: Behr Manning (Canada) Ltd., Brantford.
For Export: Norton Behr-Manning Overseas Inc., New Rochelle, N. Y., U. S. A.

9-1

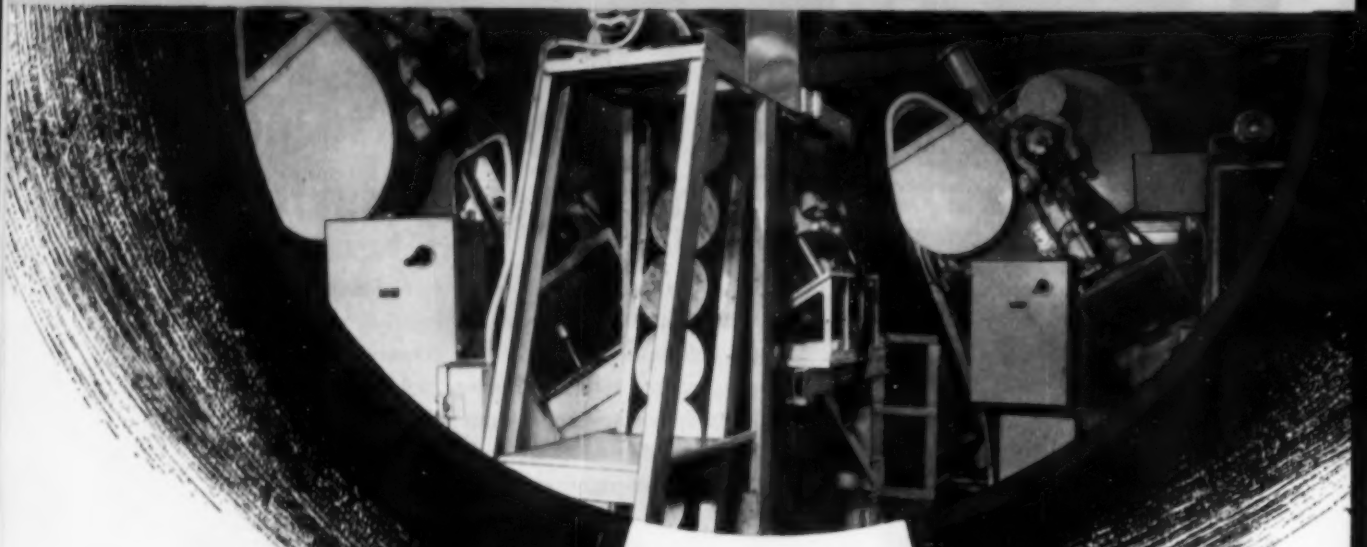
BEHR-MANNING
division of NORTON Company

▲ COATED ABRASIVES
▲ SHARPENING STONES
▲ PRESSURE SENSITIVE TAPES

keyhole view of key operations in . . . . .



4 NIAGARA AUTOMATIC OBI's PUNCH OUT



(Upper)
Two Niagara OBI's operate on each of the two G-E automated production lines at Building 85.

(Lower)
Fully automatic, 4 Niagara OBI's are fed by magnetized conveyor belts. Stator punchings leave press on upper conveyor and rotor punchings on lower, at rear of press. Scrap is discharged to under-floor conveyors.

Tri-Clad® 'SS' Motors such as this are manufactured in Building 85.

GENERAL ELECTRIC'S "SUPER SECRET" BLDG. 85 WHICH CUT MOTOR PRODUCTION TIME FROM 2 WKS. TO 24 HRS.

Strictly "hush-hush" for its first year and a half of operation, General Electric's now widely publicized Building 85 in Schenectady gives the rest of the metalworking industry plenty of food for thought.

Chopping down production time of 7½ - 30 hp induction motors, from 2 weeks to 24 hours, is no mean feat. G.E.'s medium induction motor department has done it with the very latest ideas in mechanized fabrication.

Helping to perform the important job of punching out lamination blanks for stators and rotors are 4 fully automatic Niagara OBI Presses. Each is equipped with General Electric ACA adjustable speed drives for maintaining flexibility in the flow of parts to meet market demands for 100 standard motor models . . . the very feature that Building 85 is famous for: *Variety and Automation, too!*

Fitting perfectly into the scheme of things at this, the most modern of electric motor plants, Niagara OBI's operate on fully automatic cycles. Automatically fed by magnetized conveyor belts, they likewise discharge their work automatically to the next operation. Metal waste is removed by under-floor conveyors.

Tough assignment for an OBI? Not for a Niagara! On last report, G.E. was getting 100,000 punchings per press from each set of dies

ROTOR AND STATOR LAMINATION BLANKS

between re-grinds. Longer die life is one of the assured benefits from the rugged, rigid, all-welded steel Niagara frames.

Pacemaker of the press industry, Niagara has the most to offer in OBI's . . . whether it's the Single Crank Electro-Pneumatic Clutch type used in this G-E plant, the Double Crank type for long die area work or the revolutionary new Front-to-Back Crankshaft design in automated or standard models. Now that you have the G-E story, get the whole Niagara story, too. Request literature.

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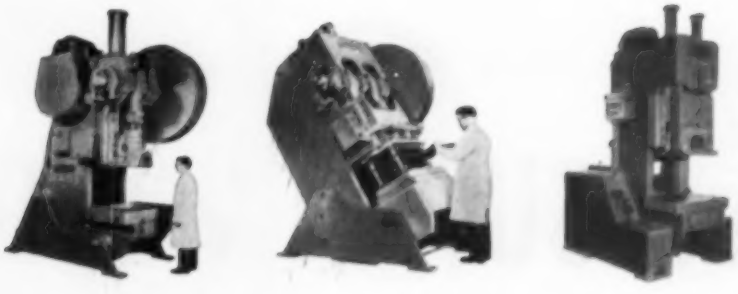
NIAGARA OBI PRESSES



Intense heat no problem for Super Belts

This hydraulic press at Hackney Iron and Steel Co., Enid, Oklahoma, shapes red hot steel plate into tank heads.

The flat leather belt formerly used on this type of press, would stretch, slip, and come off. Tightening the belts only overloaded the bearings. For this press, a Gates Super Vulco Rope drive was chosen because it withstands the near-by intense heat, and its extra horsepower capacity permits lighter weight sheaves; thereby reducing load on bearings.

Claude King, maintenance superintendent, reports: "This Gates V-belt drive has operated 8 hours a day for 5 years without lost time due to maintenance."

Super Belts on vibrator last 7 times longer

James Gann, general superintendent of John B. LaGarde, Inc., Anniston, Alabama, reports:

"Practically every condition exists to shorten V-belt life on the vibrator drive of this concrete block machine. The machine starts and stops 4 times a minute. Intense vibration must be absorbed by the V-belts to protect motor and bearings. Sand and concrete, oil and grease all get into the drive.

"With Gates Super Vulco Ropes, we get about 7 times the average life we received from any other make. It is hard to believe that belts can take this punishment, but Gates Super Vulco Ropes do it."

Solve tough drive problems with this super tough V-belt

If present V-belts are wearing out too fast . . . if heavy shock loads . . . oil and heat . . . or other conditions are causing too frequent replacement . . . here's the answer:

Gates Super Vulco Rope—the oil and heat resistant V-belt with 40% more horsepower capacity. Easily handles heavy shock loads.

That means longer V-belt life and *cost savings two ways*—savings on belt replacements and savings on maintenance down-time.

Let a Gates V-Belt specialist help you solve *any* tough drive problem. He'll make recommendations without obligation. Gates offices and distributor stocks are listed in the phone book yellow pages in all major industrial centers. The Gates Rubber Co., Denver, Colorado—*World's Largest Makers of V-Belts.*

The Mark of Gates *Specialized Research*

TPA 104

Gates SUPER VULCO ROPE Drives

dependable!

WEIRTON

high carbon strip
cold-rolled spring steel

for high-speed blanking or forming

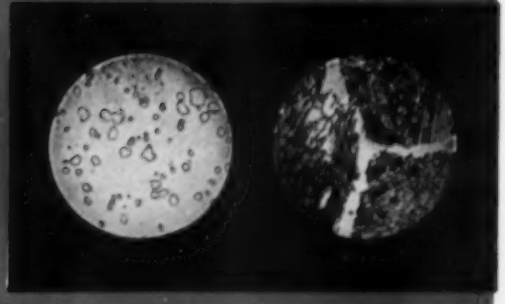
Where high fatigue-resistance is a principal factor, Weirton cold-rolled spring steel furnishes high carbon strip in the consistent uniformity necessary to meet the most exacting requirements of a wide variety of products. The close manufacturing control featured at Weirton results in several unique and highly desirable qualities—such as accurate response to heat treatment . . . uniformity of gauge and width . . . uniform chemical and physical properties . . . exact consistency of grain structure . . . controlled decarburization limits.

Pearlitic and spheroidized structures are available with desired chemical analyses and for specific heat treating and hardness. When you call Weirton you call for easier blanking and cold forming. And, at Weirton, you get what you call for.

WEIRTON STEEL COMPANY

Weirton, West Virginia

NATIONAL STEEL CORPORATION

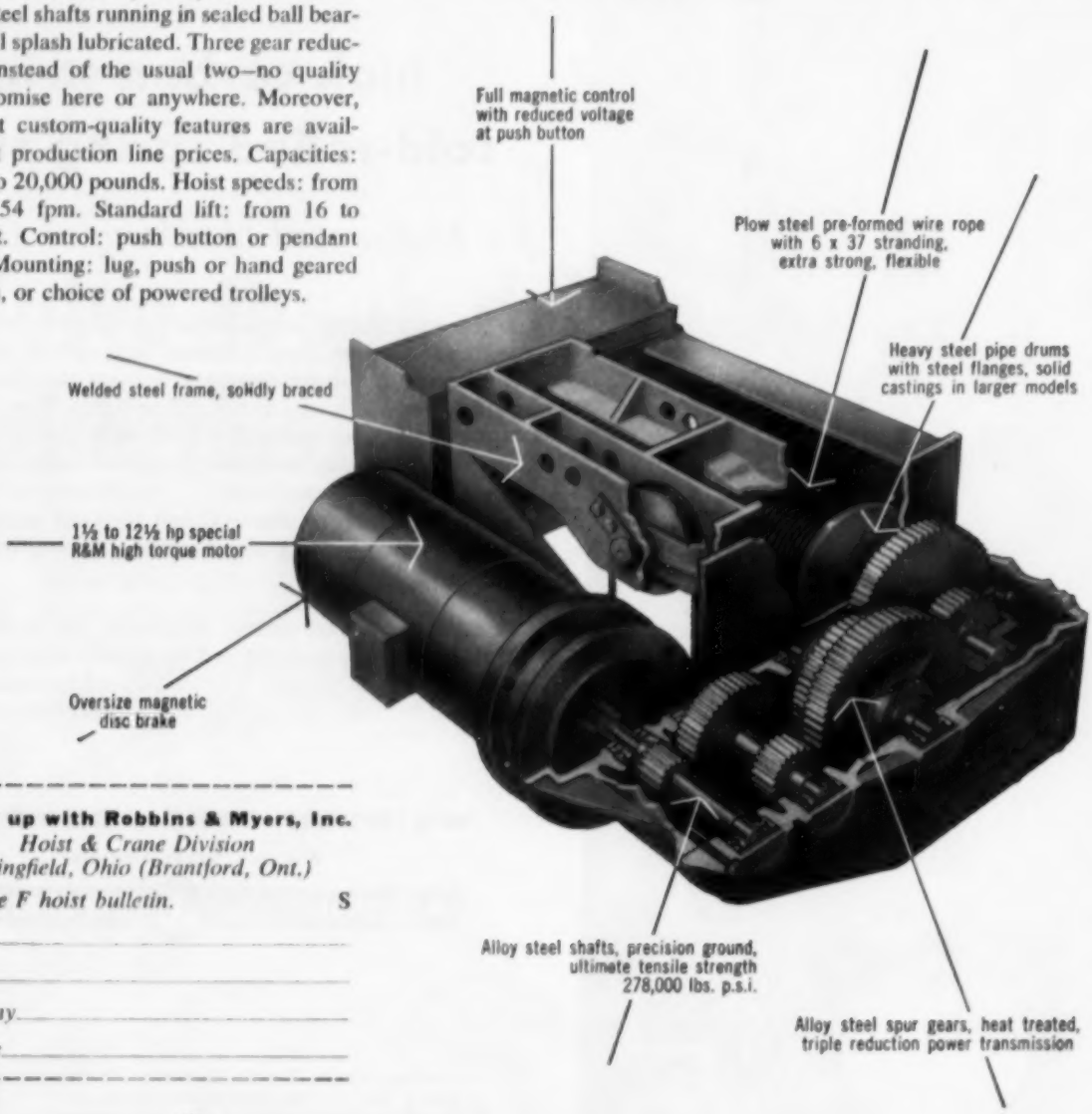


The photomicrograph on the left illustrates Weirton high carbon strip that has been spheroidized and annealed—soft and ductile—ideal for cold-forming operations. The one on the right shows the pearlitic steel structure, temper-rolled in controlled hardness and strength for clean, economical blanking procedure.

WEIRTON STEEL COMPANY

F hoists cut down the cost of lifting but the F hoists save still more money. Dollars usually spent on maintenance become dollars earned because of the extra stamina built into each component. Look at the gearing—here are precision cut alloy steel spur gears, wide faced and heat treated for durability. They're mounted on alloy steel shafts running in sealed ball bearings, all splash lubricated. Three gear reductions instead of the usual two—no quality compromise here or anywhere. Moreover, F hoist custom-quality features are available at production line prices. Capacities: 1000 to 20,000 pounds. Hoist speeds: from 10 to 54 fpm. Standard lift: from 16 to 40 feet. Control: push button or pendant rope. Mounting: lug, push or hand geared trolleys, or choice of powered trolleys.

choose a hoist with extra stamina


Full magnetic control with reduced voltage at push button
Plow steel pre-formed wire rope with 6 x 37 stranding, extra strong, flexible
Heavy steel pipe drums with steel flanges, solid castings in larger models
Welded steel frame, solidly braced
1½ to 12½ hp special R&M high torque motor
Oversize magnetic disc brake
Alloy steel shafts, precision ground, ultimate tensile strength 278,000 lbs. p.s.i.
Alloy steel spur gears, heat treated, triple reduction power transmission

take it up with Robbins & Myers, Inc.
Hoist & Crane Division
Springfield, Ohio (Brantford, Ont.)

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*Company*_____

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ROBBINS & MYERS **hoists • cranes • winches**

Size is relative . . .
but these stainless steel heads are big and heavy gauge in anyone's eyes. They are typical, too, of the unusual in Carlson service.

When you want stainless steel plates,
plate products, forgings, bars, and sheets (No. 1 Finish)

come to your headquarters for service

Stainless Steels Exclusively

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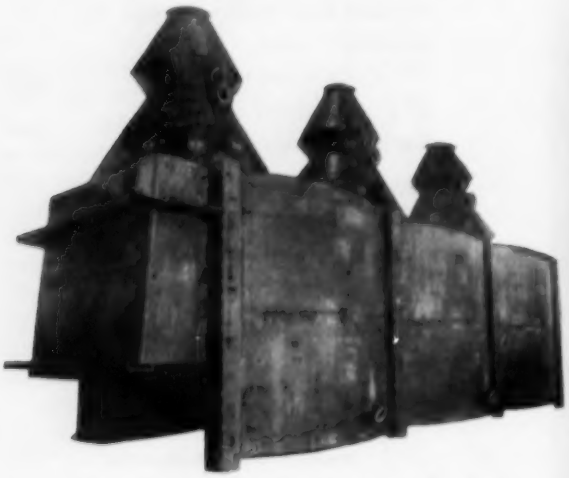
These four semi-elliptical heads are made of Type 304 stainless steel. Outside diameter: 74¾". Gauge: 2.58" minimum. Weight: Each head weighs over 3 tons.

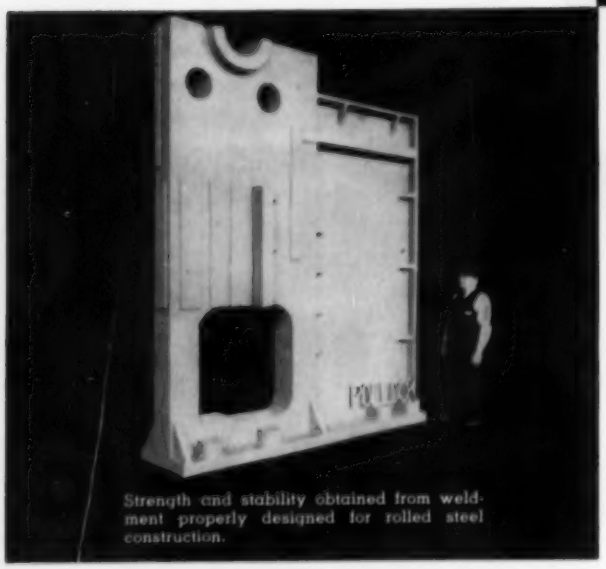
Complete Facilities

for all steel plate fabrication and erection



Intricate light gauge steel construction requiring precision fitting.

Complicated pipe connection including carefully fitted hi-carbon liner plates.



Strength and stability obtained from weldment properly designed for rolled steel construction.

Heavy weldment replacing steel casting, making better job and with considerable savings.

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CINDER AND SLAG CARS • INGOT MOULD CARS
CHARGING BOX CARS • WELDED OPEN HEARTH LADLES

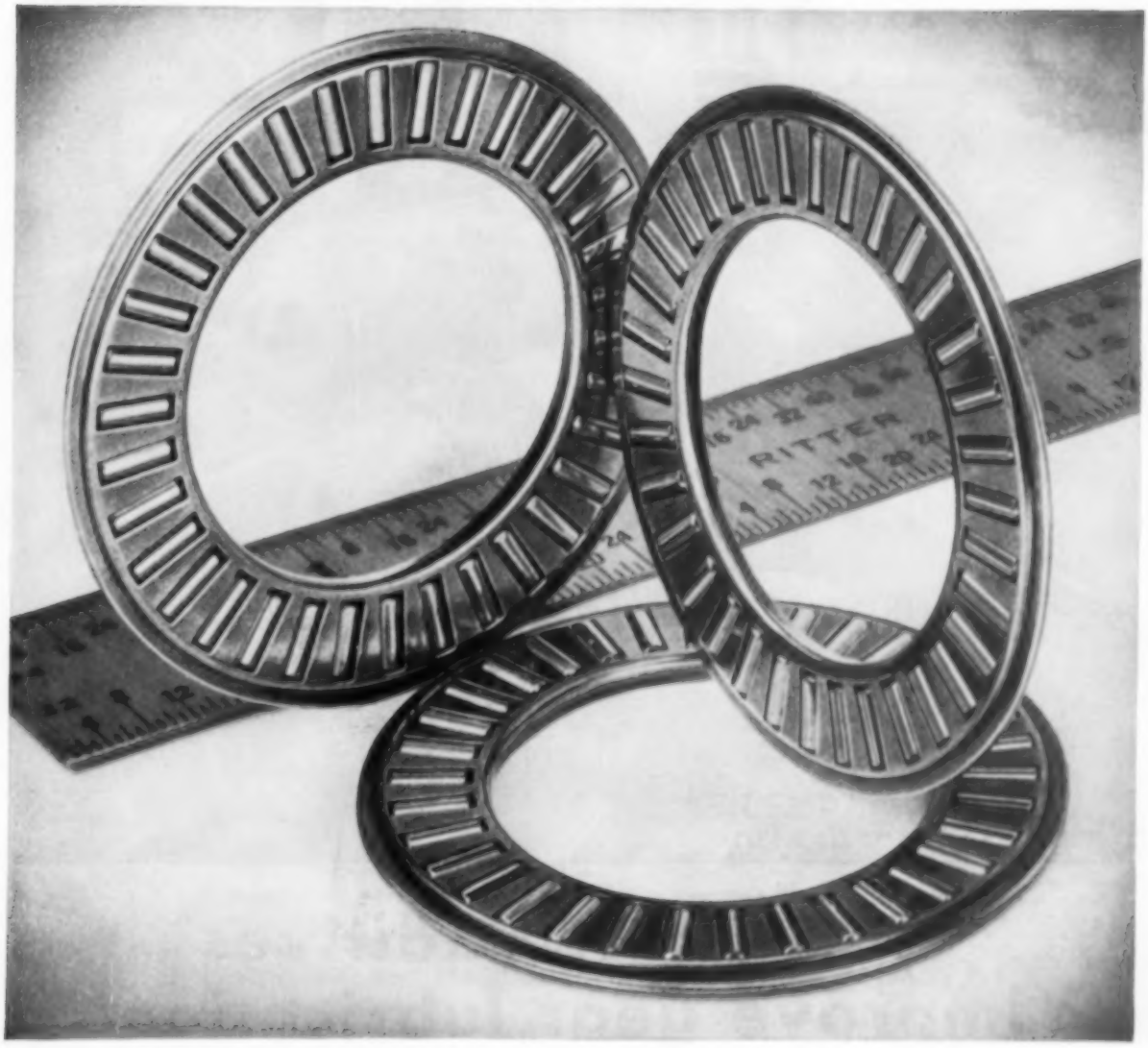
Your steel plate work of all kinds is in safe hands at The William B. Pollock Company. Pollock methods, machines and men have served the steel industry since 1863.

Pollock's modern production techniques and experience help cut your costs on all steel plate work. Precision machines are employed in forming, flame cutting, welding and machining plate from ¼" to 7" thick. If your weldments have finished surfaces or are joined to machined castings, Pollock can do the entire job for you . . . we are prepared to erect in the field the steel we fabricate. Your inquiries are invited.

STEEL PLATE CONSTRUCTION • ENGINEERS • FABRICATORS • ERECTORS

THE WILLIAM B. POLLOCK COMPANY

YOUNGSTOWN, Since 1863 OHIO



Here's the **NEW** Torrington Needle **THRUST** Bearing!

Now designers have available a *needle bearing* exclusively for heavy *thrust* loads.

This compact Torrington Needle Thrust Bearing—only .0781" in cross section—is no thicker than an ordinary thrust washer. Yet it brings all the advantages of anti-friction operation at low unit cost for many thrust applications.

Two mating retainer halves, highly accurate steel stampings, are securely joined to form a self-contained unit closed on OD and ID. The bearing can run directly on adjacent parts, hardened to act as races, or on economical hardened and ground flat races. The bearing is piloted on the retainer bore.

In any thrust application where low unit cost, high thrust capacity and compact design are primary factors, consider the Torrington Needle Thrust Bearing. Services of our Engineering Department are available to assist you with design and application.

Send for our new Bulletin, "No. 27—Torrington Needle Thrust Bearings," for full information.

Highly successful applications of the Torrington Needle Thrust Bearing have been made in automatic transmissions, governors, steering gears, bevel gears, hydraulic pumps, and torque converters.

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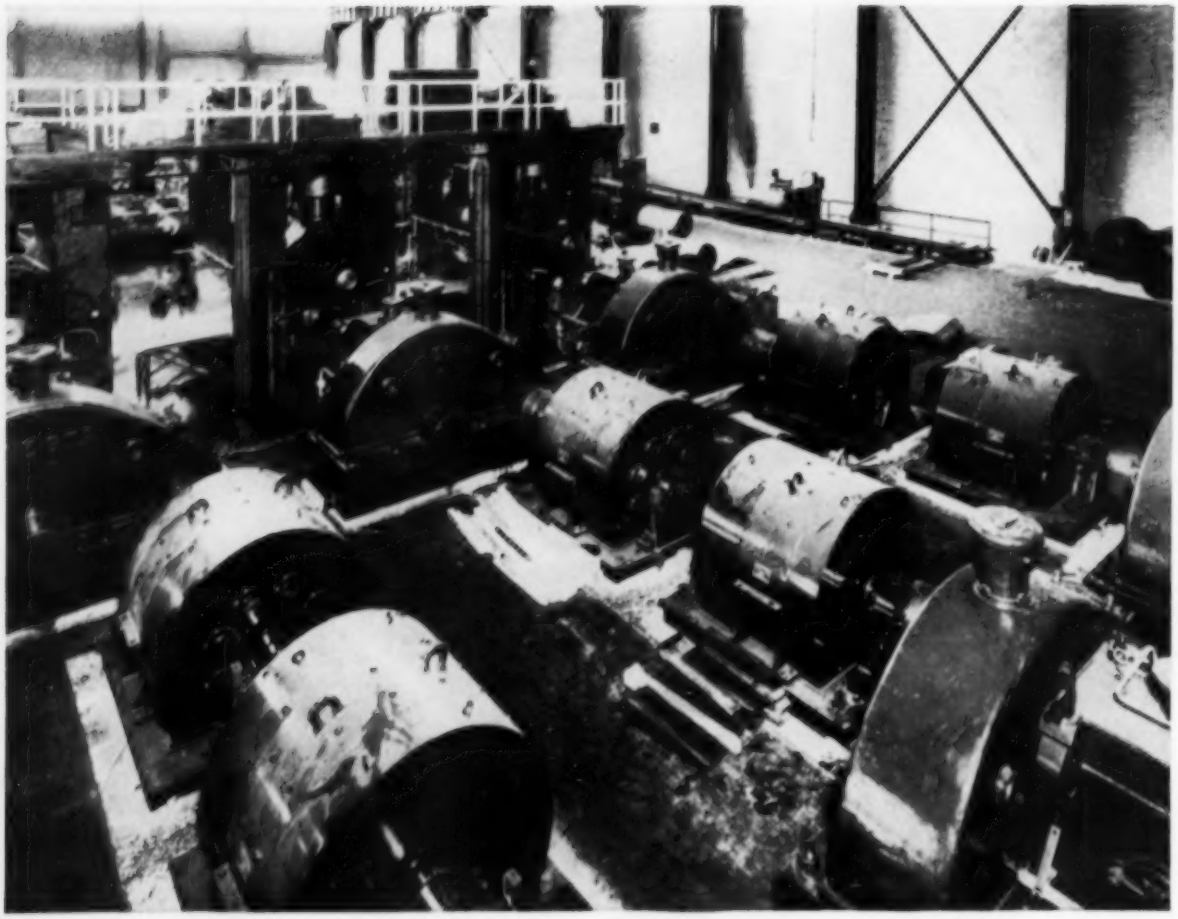
Needle • Spherical Roller • Tapered Roller • Cylindrical Roller • Ball • Needle Rollers



How polar additives improve gear lubrication

TO be effective, a lubricant for enclosed reduction gears and bearings must cling to metal even under adverse conditions. That is why *Texaco Meropa Lubricant* is fortified with polar additives—to assure a tough lubricating film that *stays on* the metal under *all* conditions.

In addition, you'll find that *Texaco Meropa Lubricant* has outstanding extreme pressure properties—EP that withstands shocks and heavy duty steady loads far in excess of manufacturers' requirements, and outlasts other lubricants.

Texaco Meropa Lubricant resists thickening; will not foam, will not separate, will not corrode gear or bearing metal.

Texaco Lubrication Engineering Service will gladly help you get the most efficient operation from all your equipment. Just call the nearest of the more than 2,000 Texaco Distributing Plants in the 48 States, or write:

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The Texas Company, 135 East 42nd Street, New York 17, N. Y.

TEXACO

TEXACO Meropa Lubricants

FOR STEEL MILL GEAR DRIVES

Warehouse Steel Stocks in Fair Shape

For the time being, users who customarily rely on warehouses for their steel will not be in serious trouble. Warehouse supplies are in good shape except for plates, structurals and nickel steels, reports the American Steel Warehouse Association. Warehouse stocks amount to about 2.5 million tons of industrial steel products—some 800,000 tons low because of plate and structural scarcities. Except for the three categories noted, warehousemen could supply their usual customers for at least four months if they buy at prestrike levels.

Strike Idleness To Climb

Watch for strike idleness in 1956 to be the highest since 1952. The steel walkout will push totals up. In the first four months of this year, 7.7 million man-days were lost, the highest in any comparable period since 1952. That year, 59.1 million man-days were lost, compared with 28.3 million in 1953, 22.6 million in 1954 and 28.2 million in 1955.

Accidents: Rarer, but More Severe

Industrial accidents are becoming less frequent but more serious. The National Safety Council reports 6.96 disabling injuries per 1 million man-hours last year, 4 per cent less than in the year before. That's the first time the all-industry rate has been held to less than 7. The communications industry had the lowest accident frequency rate, but it had the second highest severity rate. That's figured on the number of days lost per 1 million man-hours. The all-industry severity rate in 1955 was 815, up 2 per cent from 1954.

Shift to the West?

"A rapidly increasing percentage" of nuclear engineering is being concentrated on the West Coast, particularly in California and the San Francisco Bay area, claims General Electric Co. George White, manager of GE's Atomic Power Equipment Department, says many of the most vital problems involved in the development of economic atomic power will be solved there. GE, itself, is moving its atomic power department to San Jose, Calif. From now until 1960, Mr. White estimates that the cost of building a sizable atomic power generating plant of the boiling reactor type at $230 to $270 per installed kilowatt. A conventional plant of the same size costs about $150 per kilowatt.

Reynolds Mines Haitian Bauxite

Reynolds Metals Co. will begin bauxite mining operations in Haiti the latter part of this month. The new facilities, which will be completed in early 1957, are designed for production of some 400,000 tons annually. Reserve capacity will be sufficient to process 900,000 tons per year. Rey-

nolds has three other primary sources for bauxite—in Arkansas, Jamaica and British Guiana.

Power in Electronics

Look for electronic sales to continue strong through the rest of the year. According to the Commerce department's midyear survey, 1956 production should reach $6.8 billion, up 8 per cent from 1955. Portable TV sets will help plump the TV market to $1 billion, as will the recent price cuts on color receivers, now retailing under $500. Demand in other electronic lines, like transistors, tubes, and military components, is holding up, also.

Gusher for Oil Field Equipment

Indications are that oil field machinery and equipment sales will be up 10 to 12 per cent over those of 1955. Unless the present rate of oil and gas well completions is slowed by a shortage of oil country tubular goods, close to 60,000 wells will be completed this year, a new record.

Expansion in Communications

Prompted by snowballing demand for its services, the communications industry will spend $2.4 billion this year for new facilities, by far the largest annual outlay in its history and about 29 per cent above last year's levels. Another $63 million will go to expand capacity of communications equipment manufacturing plants. By the end of this year, 4 million more telephones will be in service. Out of an estimated total of 47.8 million households, 37.4 million will have phone service. Employment in the manufacturing industry is expected to increase about 15.5 per cent and in the operating industry about 7 per cent from 1955.

New Markets in Photography

Growing industrial and commercial uses are major reasons for the prediction that production and sales of photographic equipment, materials and supplies this year will reach a high of $1.6 billion. This would be up nearly 9 per cent from 1955, the previous record.

Straws in the Wind

Gulf Oil Corp., Pittsburgh, says that preliminary drillings suggest large deposits of columbium ore at Nemegosenda Lake, Ontario . . . Slag production, says the U.S. Bureau of Mines, hit a new high at 32.5 million tons last year . . . More than 3 million lb of titanium have come from the ingot-melting furnace at Titanium Metals Corp. of America's Henderson, Nev., plant. The furnace regularly produces 6000-lb ingots, and can turn out ingots weighing over 10,000 lb . . . During the first two weeks of last month, the Office of Defense Mobilization issued certificates of necessity for accelerated tax amortization amounting to slightly over $148 million . . . France will build a large steel plant at Dunkirk harbor, to cut costs of hauling imported coal, iron ore and other raw materials; export costs will be reduced, too.

CMP
RESTRICTED SPECIFICATION
COLD ROLLED STRIP STEEL
Processed to meet special gauge tolerances and provide special finishes and physical properties . . . solves many fabrication, cost & performance problems.

Helping to overcome metal fabricating difficulties, improving products without skyrocketing costs or just getting costs down are usual events with **CMP.**

For example, the manufacturer who was heat-treating formed steel parts subsequently assembled with other components into a powered unit. The forming involves severe deformation and was hampered by lack of uniformity in the annealed strip steel. Distortion in the heat treatment followed, resulting in a low percentage of finished assemblies passed as satisfactory.

To minimize these fabricating difficulties, **CMP** developed a special annealing process for the strip. Using this steel, parts, when subjected to the manufacturer's standard heat-treating practice, were acceptable and yield was greatly increased.

At **CMP,** processing cold rolled strip steel to restricted specifications has been reduced to an exact science and **CMP** men have been trained to spot opportunities for solution of production cost and product improvement problems through application of restricted specifications.

Why not put your problems up to a **CMP** man?

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THE COLD METAL PRODUCTS CO.
GENERAL OFFICES: YOUNGSTOWN 1, OHIO
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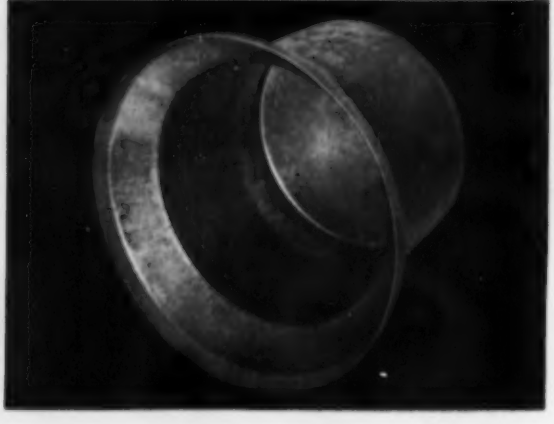
CMP
RESTRICTED SPECIFICATION
COLD ROLLED STRIP STEEL
is available in
Low Carbon Grades • High Carbon Spring Steel (annealed and tempered) • Stainless Types • Alloy Grades • Electro Zinc Coated

Here's a 20-year service record of

LOWER COSTS, EASIER SALES FOR USERS OF DEEP-DRAWING ARMCO ZINCGRIP STEEL

Products such as these have been made of Armco ZINCGRIP Steel since 1936.



For more than 20 years drawn and severely formed parts like these have been made of Armco ZINCGRIP Steel at less cost in the shop. The reasons are: no flaking or peeling of the special hot-dip zinc coating, elimination of finishing after fabrication, and the production advantages of ZINCGRIP coils. ZINCGRIP also helps boost sales because of its attractive appearance and unbroken protection against rust.

In 1936, when Armco introduced ZINCGRIP, the *first* continuously zinc-coated sheet steel, designers and production men found it difficult to believe that a zinc-coated sheet could be drawn without damage to the coating. But a few trials—reverse draws, lock seams and roll forms—proved that the special coating on ZINCGRIP didn't flake or peel.

Proved in 20 Years' Service

More than 20 years' experience in hundreds of manufacturing plants has established this fact: *Anything that can be done with sheet steel can be done with Armco* ZINCGRIP. You don't have to baby it in the shop, and its formability gives you much greater freedom in design.

Twenty years have also proved that ZINCGRIP resists yellow rusting longer than ordinary galvanized. This, plus the smooth, attractive surface of ZINCGRIP, makes products easier to sell and keeps your customers satisfied.

ARMCO STEEL CORPORATION

ARMCO®

1826 Curtis Street, Middletown, Ohio • Sheffield Steel Division • Armco Drainage & Metal Products, Inc. • The Armco International Corporation

Forcing Productivity

Steel users have been well conditioned for a hefty price increase. Statements by leading producers over the last six months left no doubt in consumers' minds that steel prices would go up after this summer's wage settlement. Two explanations have been forwarded: The increased cost of labor will be recaptured, and something will be added to help the producing industry finance its huge expansion program.

The current strike merely delays the price increase. Most consumers are resigned to paying substantially more for steel when production is resumed. How they can handle the increase is causing more concern.

Where steel is the major cost element in a product, consumers will pass along the increased material costs, plus their own higher wage costs, to their customers. They have no alternative. Freight car builders, for example, estimate that a 10 per cent increase in steel prices would raise the cost of a $7000 boxcar by as much as $500. Builders can't absorb increases like that.

More complicated is the problem of hundreds of smaller metalworking companies caught in the wage-material increase squeeze. Many are in competitive situations where they find it difficult, if not impossible, to pass along their increased costs. At best, they find it inadvisable to raise their prices immediately.

Managers of scores of those companies, mostly in the 100 to 500 employee range, discussed their worries frankly in comments made for this magazine's midyear survey of what's ahead for metalworking. Some complained bitterly about the annual cost-price squeeze that has confronted them in almost every postwar year. Some are pretty discouraged.

But most are working out their own answers. They are figuring how they can take the increase in material and wage costs, hold prices near present levels and still make a profit. Here are some verbatim comments:

> We are installing automatic equipment which will enable us to increase production 50 per cent without increasing employment—Aircraft component maker.
>
> We believe our profits will be higher, despite increased steel and wage costs and steady prices. We have revised our manufacturing methods to offset the higher costs—Transmission and speed reducer builder.
>
> Prospects for increased steel and wage costs are forcing us to improve our manufacturing productivity. We thought we were pretty efficient, but we now find we can still improve—Office furniture manufacturer.
>
> Faster and more automatic machinery now being purchased will up our productivity by more than 40 per cent—Industrial sweeper producer.

The spirit behind these and scores of similar comments is heartening. Faced with tough and often discouraging problems, metalworking management responds by forcing productivity to rise.

Walter J. Campbell

EDITOR

The Steel Strike

and

Ryerson Steel Service

We hope the steel strike will be settled by the time you read this page. Every day of lost production has meant a loss of over 300,000 tons of steel, according to current estimates.

What about Ryerson stocks during this emergency? For the present our inventories of high quality carbon, alloy and stainless steels are large and varied—adequate to fill orders for warehouse quantities of most all kinds, shapes and sizes. So we undoubtedly will be able to help you. Especially since our experienced steel men can often suggest practical alternates or draw on one of our 16 other plants if by any chance your needs are not available locally.

As always, we will fill orders as promptly as possible, at our regular prices. So continue to contact your nearby Ryerson plant for your steel requirements and we will do our best to take good care of you.

JOSEPH T. RYERSON & SON, INC.

EVERY KIND OF STEEL IN STOCK • ALSO MACHINERY & TOOLS, INDUSTRIAL PLASTICS, ETC.

JOSEPH T. RYERSON & SON, INC. PLANTS AT: NEW YORK • BOSTON • WALLINGFORD, CONN. • PHILADELPHIA • CHARLOTTE, N. C. • CINCINNATI CLEVELAND • DETROIT • PITTSBURGH • BUFFALO • CHICAGO • MILWAUKEE • ST. LOUIS • LOS ANGELES • SAN FRANCISCO • SPOKANE • SEATTLE

What Steel Strikes Cost

Year	Length	Tons Lost, Steel Ingots	Steelworkers' Loss in Direct Wages	Avg. Steelworker's Loss in Dir. Wages	What 1956 Steel worker would lose in strike of comparable length
1952	7½-weeks	15.3 million	$261 million	$591	$741
1949	5 weeks	10.5 million	$148 million	$342	$494
1946	4 weeks	*12 million	$84 million	$216	$395

*Losses aggravated by coal strike that was partly concurrent with steel walkout

Steel Strike: Costliest Yet?

The fourth major steel walkout in a decade may be the most expensive. Weekly wage losses will be highest. Shortages will be aggravated. Construction will be hit

THE NATION'S economy lost $250 million last week—in steel and dependent industry sales that couldn't be made, in direct wages that went down the drain, in the expense of closing down steel and other facilities.

In addition is the incalculable loss in missed opportunities to sell goods and services to the 490,000 strikers who left their jobs at midnight, June 30, and to the thousands already laid off in dependent industries. Average weekly loss in purchasing power, potential savings and taxes: Nearly $100 a worker. And losses mount as a walkout drags on.

Supporting activities for steelmaking were grinding to a halt last week. Some ore vessels were tying up. Railroads and truck lines were laying off personnel.

U.S. Intervention?—A federal mediator was scheduled to meet with both sides last Thursday in an exploratory session. Governmental spokesmen emphasized that they would keep the role of the U.S. strictly one of mediation.

The major issue remained the length of the contract. Both sides are probably closer on the other issues than their press statements would indicate. (See page 54 for the original labor demands and the steel companies' offer.)

The Effects—If we have a 53-day walkout as we did in 1952: Only 95 million net tons of steel ingots would be produced this year instead of 125 million; only 5.2 million autos would be sold instead of 5.8 million; the national economy would lose $5 billion in sales and wages.

The real impact of the steel strike on metalworking won't be felt for another two weeks. Here and there, users of the tight products like structurals and plates, will be hard pressed immediately, but most will go along comfortably until the last week in July. Even early settlement of the dispute would mean that normal steel operations couldn't be resumed until late this month.

Results—The tragedy of this steel strike is that it will give pause to one of the major bulwarks of the economy, construction. Builders are heavy users of plates and structurals, and they will be hit first. But another segment of the economy, automotive, doing only so-so, probably has enough steel to last at least two months. If this strike "firms" the steel market, it will do so in the wrong quarters.

Thoughtful management men both in and outside the steel industry agree that strikes rarely do the economy any good. The 1946 walkout delayed conversion to peacetime activity. Many believe that the five-week work stoppage in 1949 prolonged the slump that year. The 1952 debacle—the 53-day main strike, plus two earlier brief walkouts when the government intervened—may have so undermined confidence that a budding boom didn't reach full flower until mid-1953. Even the 12-hour strike July 1, 1955, contributed to shortages that weren't resolved when the steelworkers hit the bricks again 12 months later.

A New Look—Economic prospects for the last half must be reappraised — downward, probably, for at least the third quarter. The effects of idleness in steel mills fan out amazingly.

For example: On Apr. 28, 264 trainmen struck U.S. Steel Corp.'s Tennessee Coal & Iron Division at Birmingham; some 25,000 steelworkers were idled as a result;

another 35,000 workers in other industries in Alabama and Mississippi alone were laid off for lack of steel.

Some 20 times as many steelworkers are involved in the national strike. Are the effects going to be 20 times as bad?

Some Still Comes

Though the bulk of the steel industry is shut down, a few plants are operating

DESPITE the strike, companies with some 14 per cent of the steel industry's ingot capacity are still operating.

Reasons: 1. Work is continuing under extension of the old contract. New contracts will be retroactive to July 1; terms will follow closely those negotiated by the industry. 2. Present contracts with United Steelworkers of America have not expired. 3. Plants are not organized by the USW.

Cases—Granite City Steel Co., Granite City, Ill., is one of the larger producers in the first class. Its ingot capacity tops 1 million net tons a year.

Granite City is an integrated company. But most of the steel producers operating under contract extension aren't. Acme Steel Co., Chicago, for example, buys its billets from Inland Steel Co., Chicago, and U. S. Steel Corp., Pittsburgh. Acme has no idea how long it can operate from inventory.

Breathing Spell — Continental Steel Co., Kokomo, Ind., has a USW contract which expires July 31. If there is no industry settlement before then, it's a good bet that the union will strike Continental, too.

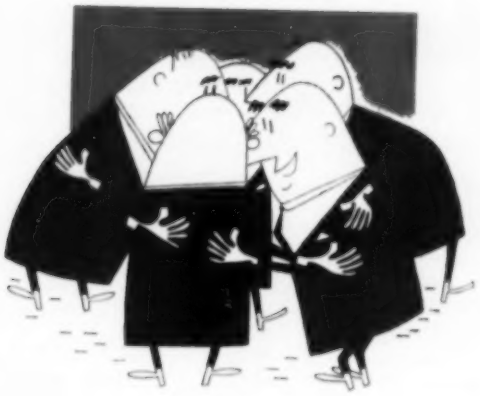
Other agreements in this class include those of Laclede Steel Co., St. Louis; E. J. Lavin & Co., Lynchburg, Va., and Palmerton, Pa.; the Milton, Pa., plant of Merritt Chapman & Scott Corp.; and Simonds Saw & Steel Co.'s Rockport, N. Y., plant.

No Contract — Companies not organized by the USW include Armco Steel Corp. at Middletown, O., and Butler, Pa.; Ford Motor Co., Dearborn, Mich.; Weirton Steel Co., Weirton, W. Va.; and Wisconsin Steel Co., South Chicago, Ill.

Battle Lines in Steel

Here are the prestrike platforms of the steel companies and the union. Three days before the strike, the company offer was amended from a five-year to a 52-month contract, with "proportionate" reductions in benefits offered under the five-year proposal. The reduction was not spelled out

THE ISSUE	COMPANY OFFER	UNION DEMAND
Pay	6-cent hourly boosts each year for five years, plus 0.2-cent increases between job classes each year	substantial pay boost
SUB	company contributions of 5 cents an hour to 52-week SUB, with restrictions	company contributions of 5 cents an hour to 52-week SUB, with no restrictions
Insurance	improved benefits, cost shared by company and employees	no employee contribution
Holidays	one more—the day before Christmas starting in 1957	two more, premium pay in addition to holiday pay for hours worked
Pensions	$2.50 per month for each year worked after 1957	Increase to be applied on years already worked
Vacation Pay	starting in 1958, 1 to 1½-weeks for 3 to 5 years' service, 2½-weeks for 10 to 14 years' service, pay based on previous years' earnings. Workers must take pay in lieu of vacations if requested	1 week for 1 year's service 2 weeks for 2 years' service 3 weeks for 3 years' service 4 weeks for 15 years' service
Shift Premiums	1 cent increase (to 7 and 10 cents) for second and third shifts in 1958; another increase in 1960—1 cent for the second shift, 2 cents for the third	5 per cent extra for the second shift, 10 per cent extra for the third shift
Saturday and Sunday Pay	Night shift rates for Sunday starting in 1959	double time for Sunday, time-and-a-half for Saturday
Reporting Pay	no offer	boost 4 hours' reporting pay to 8 hours
Jury Pay	starting 1959	



Group attack on broad problems is Motorola's key to . . .

Building Better Bosses

"THE ESTABLISHMENT of a traffic department will save our company $120,000 annually."

That recommendation was made to the board of Motorola Inc., Chicago, six years ago. Today a traffic department is saving about $1 million annually for the company, its distributors and dealers.

Inspiration — The recommendation came from Motorola's advisory council to the board of directors. It's an example of the effectiveness of the firm's advisory council program—a device for multiple management and continued executive training even though the individual has earned a carpeted office with his name plate on the door.

The council has 15 members, each serving a 15-month term. Typical titles include manager of manufacturing, sales, purchasing, personnel and any other executives except company officers. Their responsibilities: 1. To study broad problems related to the conduct of the company's business. 2. To make recommendations to the board of directors with respect to those problems.

Setup—Selection of the problems to be studied is made by the council. Members, any officer or executive can propose topics. Approval by at least two-thirds of the council is required to establish a committee to conduct the investigation. Study committees generally are made up of a chairman and two members.

"Investigations can take a variety of paths," says Gerald J. Werner, present council chairman. In the traffic department study, the committee made preliminary checks within Motorola to determine some of the possible areas in which costs of inbound and outbound shipments might be reduced. Committee members also visited other companies to talk over departmental duties, problems and possible savings with traffic managers.

The final step was to contact a traffic service organization in Chicago to analyze one month's transportation charges. With this information, the committee submitted a formal written recommendation for the establishment of a traffic department—suggested personnel, duties and minimum estimated savings.

Responsibilities — The council has advisory powers only. Approval by at least eight members is necessary before recommendations are passed to the board of directors. Execution of the recommendations is the prerogative of the directors. In the case of the traffic study, they initiated action to employ a traffic manager to set up the department.

The number of studies in progress by the council averages about 12. All are given target completion dates and progress reports are made by the committee at each council meeting.

Some typical projects completed: Consumer service study, export expansion, survey of plant facilities, planning for mobilization. Studies currently under way include: Operations research, latest developments in automation, potential of new products, multiple management councils, inventory control practices.

Schedule—The advisory council meets twice monthly. Members may serve more than once, but there must be a six-month period between terms.

Officers of the council include a chairman and a secretary who serve three-month terms. Administrative details are handled through an executive committee of five members appointed by the chairman for six-month periods.

Broader Minds—"One of the highlights of our program," says Motorola's executive vice president, Robert Galvin, "is the cross pollination of ideas among the executives." An individual's chief responsibilities as a member of the management team may be in purchasing, but as a council member of a study committee he is working with sales, production or some other departmental representative on a topic which may be totally unrelated to purchasing. Members also serve on more than one study committee at a time.

Twice a year, each individual rates all other members of the council on a confidential form which goes to a liaison director—a member of the board of directors appointed by the executive vice president. Through private discussion between the liaison director and the council member, the executive learns how his associates regard his ability, performance, co-operation, etc.

Payoff—The challenge is obvious," one council member points out. "We're not only trying to accomplish a specific objective on some particular problem. We want our associates to regard us as good team members."

Not an Owner's Strike

The issue at Cleveland Pneumatic Tool: Management's right to control its subcontracting. The union fears layoffs. CPT says the union doesn't know the facts

THE STRIKE at Cleveland Pneumatic Tool Co., Cleveland, has nothing to do with the ownership of the company's stock, says Sam S. Mullin, president.

The employees do not own the stock. It is the property of two pension trust funds. Mr. Mullin phrased the situation this way: "If your company has a pension trust fund, and that fund purchases the stock of U. S. Steel Corp., do you regard yourself as a U. S. Steel stockholder?"

Ownership—In the case of the CPT pension trusts, the trust directors invested the funds in CPT stock in 1953. Two boards elected by the employees unanimously directed the trustees to do so.

Reports Mr. Mullin: "I described the purchases to the employees and made it clear that they did not own the stock."

The board of directors of CPT is of course elected by the stockholders. The stockholders are the trustees of the two funds, an institution and three individuals.

The tendency of the press to call the strike an owner's strike is "an unfortunate kind of shorthand," believes Mr. Mullin.

The Issues—Although there are several issues involved in the month-old strike, two stand out: 1. The independent union's demand for a 15 cent an hour raise. 2. Its demand for a contract clause restricting the company's right to subcontract work.

At this point, the company has answered the wage demand with an offer of 11 cents.

CPT management agrees that subcontracting must be kept to a minimum to avoid layoffs. However, says Mr. Mullin, the union does not recognize the facts.

Subcontracting Facts—To agree to the union's demand would "hamper our ability to schedule properly," says Mr. Mullin, "and make us unable to comply with Air Force requirements for subcontracting."

The union is asking a prohibition against subcontracting: 1. Which would cause layoffs. 2. Where the work could be done by CPT itself. 3. To any other division of the company.

National Water Lift — CPT bought National Water Lift Co., Kalamazoo, Mich., last February. That firm designs and manufactures control devices for aircraft. (CPT makes landing gear, ground handling equipment and hydraulic and mechanical actuators.)

Some sources feel National Water Lift is the crux of the situation. Employees fear or don't understand the new division's place in the company's setup.

Mr. Mullin's comment: "National Water Lift has plenty of capacity for manufacturing small parts. We at CPT may be able to make some of its larger parts. National Water Lift is not equipped to do our kind of work. Actually, it's the other way around. We'll get business from them."

Outlook—No settlement is now in sight, but some observers are guessing the steel negotiations have had their effect on CPT. Steel's settlement should influence this strike as it will other labor negotiations around the country.

Builds Big Stainless Tank

U. S. Steel Corp.'s products division in Los Angeles welded its largest job, a 40-ft stainless steel tank for hauling liquid sugar. A plastic envelope protected both interior and exterior surfaces of the tank during fabrication. Its capacity: 6500 gallons

Foundries Prepared

Supplies of pig iron will keep casting production high despite the steel strike

FOUNDRIES expect the first effects of the steel strike to reach them through their customers. A crimp in supplies is not expected before some order cancellations come in.

One midwestern pig iron producer says foundries have laid in heavy supplies in the last two months as hedges against the strike and a price increase.

Gray Iron—D. H. Workman, executive vice president, Gray Iron Founders' Society, estimates that most foundries have pig iron to last them for 45 to 60 days.

First order cutbacks will probably come from the building industry and road machinery industry where the shortage of structurals is severe. But some customers, thinks Mr. Workman, will use the strike period to build up casting inventories.

Foundries can make some substitution of pig iron with scrap. But most of them probably will wait a couple of weeks to see if there are indications of a long strike before making any change.

Steel and Malleable—Most malleable iron foundries will be able to operate for two months. Large producers using the duplexing process are not dependent on the supply of pig iron and can operate longer. Orders for the malleable foundries probably will follow the automotive industry's fortunes.

F. Kermit Donaldson, executive vice president, Steel Founders' Society of America, says makers of rolling mill equipment will be hit immediately by the strike. Freight car builders, source of close to 30 per cent of steel casting orders, will be next. The shortage of heavy plates and structurals will quickly cut into the car builders' production.

Physicist checks stainless steel core of the Armour research reactor

Private Atom Makes Bow

LOOK FOR a speed-up in the development of industrial uses of the atom now that the nuclear reactor at Armour Research Foundation, Chicago, has "gone critical."

The $700,000 reactor is privately sponsored. Participating companies will get the benefits of research without security restrictions or competition from the military. Twenty-four of them put up $20,000 apiece. They will also get detailed technical advice, certain patent benefits and some specialized training.

Uses—Study areas include wear in machines and tools, effects of high temperature and pressure on hydrogen diffusion in metals, the mechanism involved in the surface treatment of metals and the kinetics of slag-metal reactions involving sulphur.

Research in these areas will be accelerated: Effects of radiation on chemical reactions, plastics, glasses and metal alloys; chemical analysis through neutron activation; and structure analysis. According to Dr. Richard F. Humphreys, director of the Armour program, perhaps the most frequent use of the facility will be to produce short-lived radioisotopes. Over half of all neutron-induced radioisotopes have useful lives of less than one day.

Names—The reactor was built by Atomics International, a division of North American Aviation Inc., Canoga Park, Calif. It is a neutron and gamma ray source and is not intended for generation of electrical power or for research on reactors themselves.

Participating metalworking companies include Aro Equipment Corp., Ball Bros., Borg-Warner Corp., Caterpillar Tractor Co., Clark Equipment Co., Elgin National Watch Co., Gustin-Bacon Mfg. Co., Illinois Tool Works, Inland Steel Co., International Business Machines Corp., M. W. Kellogg Co., Ohmite Mfg. Co., United States Steel Corp. and Whirlpool-Seeger Corp.

Steel Mill in Texas

Jones & Laughlin plans an integrated steel mill for seamless pipe production at Houston

A STEEL MILL with a capacity of 1 million tons of ingots a year is being planned by Jones & Laughlin Steel Corp. Estimated cost: $250 million to $350 million. Adm. Ben Moreell, chairman, states the project is still in the planning stage.

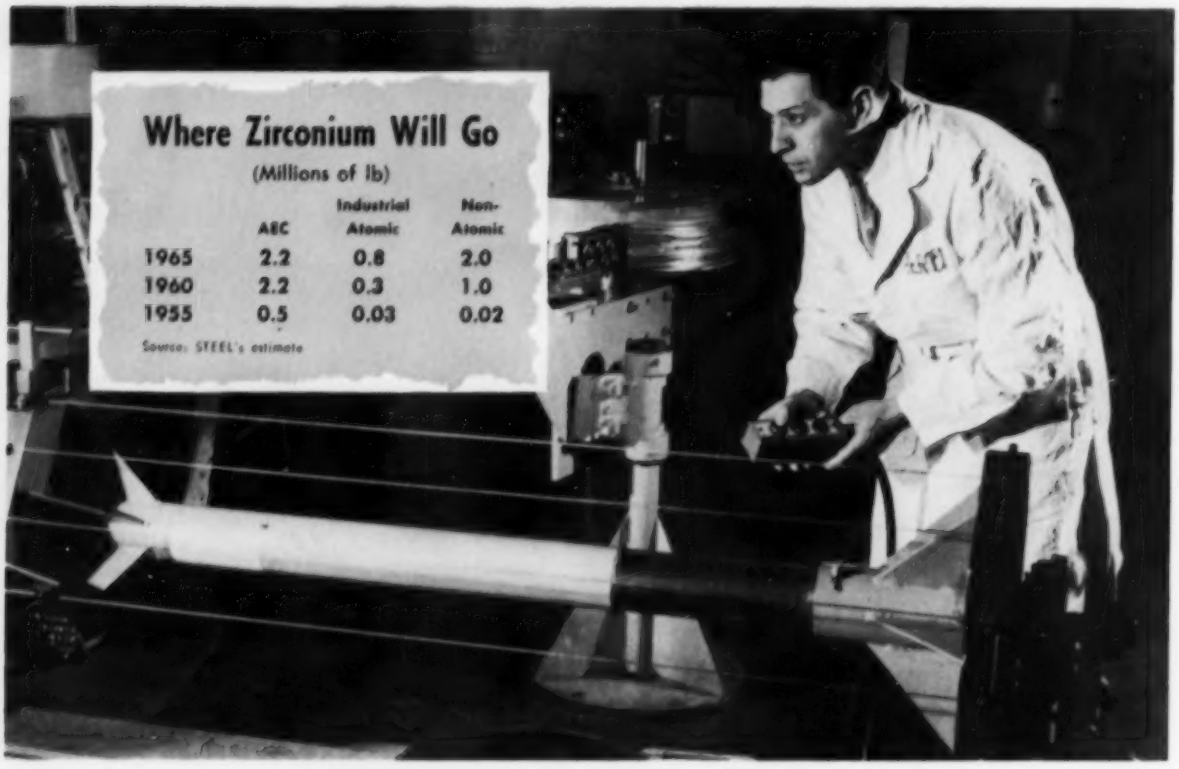
Rep. Albert Thomas (Dem., Tex.) of Houston announced the project in Washington. He says a definite conclusion probably will come in five or six months. It is assumed that the announcement is an outgrowth of filing for a fast tax write-off.

Equipment—The proposed plant has one blast furnace, four open hearths, a blooming mill, two seamless pipe mills, a stretch mill and heat treating, tempering and other equipment. Ingots would be fabricated into seamless pipe for the Southwest's oil and gas industry. Representative Thomas says the plant probably would employ between 3000 and 4000.

The Houston facility is not expected to be in production before 1959. But its need is apparent. There is an extreme shortage of high alloy tubing for work in deeper wells and in areas of greater pressure.

Expansion—The new mill would add 1 million tons to Jones & Laughlin's yearly capacity of 6,166,500 tons. It would be the second major integrated steel plant to be built in the U. S. since World War II.

The first, U. S. Steel Corp.'s Fairless works, reached its yearly rated capacity (1.8 million tons) about 34 months after ground was broken. It has since been expanded to a rated capacity of 2.2 million tons a year and more expansion is scheduled. The Houston mill would be designed with expansion in mind.



A Westinghouse atomic scientist bends zirconium wire in a production operation

More Zirconium Use Coming

Users and producers confidently expect the metal to follow a path of rapid development similar to titanium's. Technology will dictate the size of the market

HERE is an indication of zirconium's increasing importance to metalworking: Allegheny Ludlum Steel Corp. is surveying its mill customers to find out how much they'll want in the next year. The answers will shape Allegheny Ludlum's zirconium expansion plans.

The breakthrough is easy to spot: The Atomic Energy Commission's contracts for 11 million lb of zirconium over a five-year period (STEEL, May 7, p. 56).

Two Grades — AEC contracts call for reactor-grade sponge (it's hafnium free). However, the three sponge producers affected are also planning to make commercial grade.

Recognizing the need for speed, U. S. Industrial Chemicals Co., a division of National Distillers Products Corp., will complete a plant within four months. It will produce 500,000 lb of commercial grade annually. Its plant for the reactor grade (annual capacity will be 1.5 million lb) will start delivery on July 1, 1957.

Short Supply—Carborundum Co. says it can now make firm commitments for delivery of commercial-grade zirconium in 1957 and 1958. Commercial grade has been in short supply because of the government's requirements for the reactor grade. Carborundum has been producing 325,000 lb annually for the AEC. Total new capacity will be 1.5 million lb.

The third sponge producer, NRC Metals Corp., a subsidiary of National Research Corp., reports: "Commitments for zirconium are already being received from companies interested in both grades, and it is expected that this market will ultimately exceed the government's requirements." Total capacity will be over 1.5 million lb.

New Uses — Where will commercial grade go? "Its high resistance to heat and corrosion, its easy machinability and its adaptability to maintenance and repair make it valuable for piping, valves, filter screens, lining of vessels and other processing equipment," says C. G. Boland, manager, market research and development, U. S. Industrial Chemicals.

Zirconium is an efficient getter material (it removes residual gases) and its high melting point makes it important for electric and electronic uses.

As An Alloy—Some experimental work has been done by the auto industry with bearing materials containing zirconium. Tag this as

a rumor: General Motors Corp. and Ford Motor Co. are working on cheaper processing methods.

"When zirconium is added to magnesium," says one industrial source, "an alloy results with a finer grain size which gives a higher stress advantage and an increase in ductility. It also increases the high temperature resistance of magnesium."

Corrosion—Zirconium, like tantalum, resists acids and does a better job against alkalies. It's also cheaper. The chemical industry is looking at zirconium fondly.

Rounding out new uses: In nuclear food processing and the pharmaceutical industries, says Malcolm F. Judkins, manager, new products division, Firth Sterling Inc.

Used by the AEC to clad uranium fuel elements in some atomic reactors, zirconium will also do the same job in industrial atomics. The coming of commercial atomic energy is one step closer because of the new zirconium production, says NRC Metals.

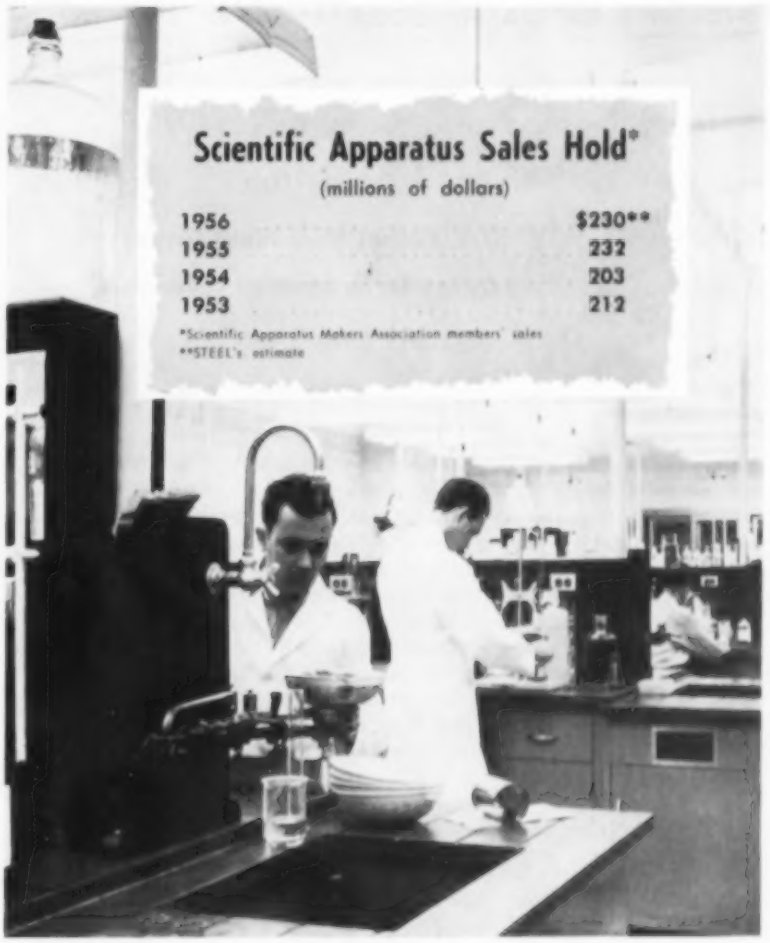
Scrap Problem—Like titanium, zirconium scrap cannot be recycled easily. In some machining operations, reports one source, there is only a 30 per cent yield.

Several firms have AEC contracts to investigate the problem. One company thinks it is on the right path, having melted a batch containing 20 per cent scrap.

New Prices — The three AEC sponge producers will operate on a plus or minus 20 per cent basis with renegotiation clauses in their contracts. They've agreed to supply the AEC with reactor-grade zirconium at prices ranging from $4.53 to $7.72 a pound.

Currently, reactor-grade zirconium is about $14 a pound, commercial grade, $10.

Outlook—Simple as it may appear, the picture boils down to one thing: Price. And the new suppliers will lick that, with help from the firms scouting the scrap problem. Comments Westinghouse: "It is rather astonishing but true that even if Zircaloy (a Westinghouse product) were twice as strong or twice as corrosion resistant, few further areas of application would develop." The new technology must wait for the price drop.



Continental Can Co.'s new research and engineering center in Chicago

Apparatus Sales Ride High

SALES OF laboratory apparatus, optical and industrial instruments in the first half have been strong enough to insure a volume of about $230 million this year. The Scientific Apparatus Makers Association figures its members sold about $232 million worth of equipment last year.

Those sales make up only one scientific apparatus product group.

Other Products — The second group includes: Recorder-controllers, laboratory furniture, surveying, drafting, nautical and aeronautical instruments—and products made by nonmembers of SAMA.

Together, the two product groups accounted for about $400 million in sales last year, about $50 million more than in 1954.

Bright Future—The long term outlook was never better, says Kenneth Andersen, executive vice president, SAMA. He reports industrial and scientific research expenditures should hit $4.5 billion in 1956.

Experts in the industry predict $56.5 billion will be spent for research in the next ten years. The annual rate should be $6 billion to $7 billion by 1965, $16 billion by 1975.

Here's a breakdown of 1955 equipment sales by SAMA members abroad and in the U.S.: Laboratory apparatus, $147 million; optical instruments, $13 million; industrial instruments, $72 million.

U.S. Pushes New Plant Dispersal; Cases To Be Studied Individually

New plants better get out of town if they expect to get defense contracts. Officials in Washington say they don't want to force industry out into the desert, but that location near one of the 50 prime target cities only serves to fatten them up for atomic attack. Putting up a plant in such an area also influences chances for fast tax write-offs. In general, the farther from a target area, the better the government likes it, though present policy calls for case-by-case studies and a mixing of the practical and the ideal in determining how a plant meets dispersal standards. Signs point to a tougher attitude. Spokesmen emphasize that dispersal policies only apply to the awarding of defense contracts to new plants; those already in target areas aren't affected.

Coming: New Overtime Index

Within a few days, business forecasters will have a new tool, courtesy of Uncle Sam: The overtime index, which has been in preparation since January. The initial report on it will cover 1956's first six months. From then on, it will be issued monthly. Expected to be a sensitive indicator of business conditions, the index may throw some light on what impact overtime pay and stepped-up consumption of raw materials have on the economy. Initial checks on the quality of the index make it look pretty good.

Fast Start on Highway Program

No time will be wasted getting the new federal highway program into operation. A survey by the Associated General Contractors indicates that $100 million worth of highway and bridge construction will be let in the next two months, another $300 million by the end of the year. Federal road men are giving themselves and the states a pat on the back for the advance work that made the quick start possible. Even more contracts might have been let under the new program this year, but some states already have the largest roadbuilding schedules in their histories under way. Road construction will hit about $5.5 billion this year, shoot to $8 billion or $9 billion by 1960.

More Controls on Nickel?

Expect to hear more rumblings from Congress and elsewhere about the nickel shortage. Calls for controls, regulation, etc., have been turning up regularly. But most of them are viewed as just talk—political year harassment of the administration, which doesn't want controls.

Representatives Drag Feet

Hoover Commission recommendations on budgeting and accounting —it's claimed they would save billions if adopted—are being held up in the House after being passed by the Senate. A move may be made to try to lose the measures in the preadjournment shuffle in spite of considerable support in their favor.

Distress Aid: New WPA?

Federal aid to distressed areas is getting a new push in Congress. Under proposals being considered, $250 million in federal money would be available for loans and gifts. Termed a new WPA by some sources, it is opposed by the administration, which favors more local action by communities affected by chronic unemployment.

Mr. Sparkman Talks Taxes

Sen. John Sparkman (Dem., Ala.) says his new tax bill would cut income taxes for all corporations earning less than $375,000 in annual net income. About 98 per cent of U. S. corporations are in that bracket. Hitting the top 2 per cent harder, the senator claims, would allow the cut for smaller firms, even bring in an additional $45 million a year to the government and "assist in stemming the trend to mergers." There's little chance of anything being done with the proposals this year.

Defense Gets $34.7 Billion

The Defense department has its $34.7 billion pay check for fiscal 1957, complete with a Senate-added $900 million for the Air Force. That sum will be used mainly for additional B-52s and for training personnel to fly and maintain them. The Air Force gets half the total budget. Defense research and development gets $1.3 billion, and Defense Secretary Wilson indicates that the trend will continue upward.

WASH THAT DIRTY STRIP
BEFORE SHEARING and BLANKING

McKAY
PRESS FEED AND CUT-UP LINES

The latest development in McKay coil feed lines is this new strip washing machine which thoroughly cleans the strip after it leaves the coil and before it passes through any subsequent feed rolls.

In most stamping plants a sizeable portion of metal finishing costs and quality control problems can be traced to the fact that some coiled steel is dirty and much of this dirt picks up on the rolls of the processing equipment. The dirt which carries over on the blanks may cause scratches in the drawn panels during the forming operations.

In several recent installations McKay has furnished a strip washing machine which utilizes high speed brushes and large volume solvent sprays to thoroughly clean the steel strip at high production speed.

CONSULT McKAY ENGINEERS IF YOU HAVE A PRESS OR SHEAR FEEDING PROBLEM. WE INVITE YOUR INQUIRIES.

The McKAY MACHINE Company
YOUNGSTOWN, OHIO

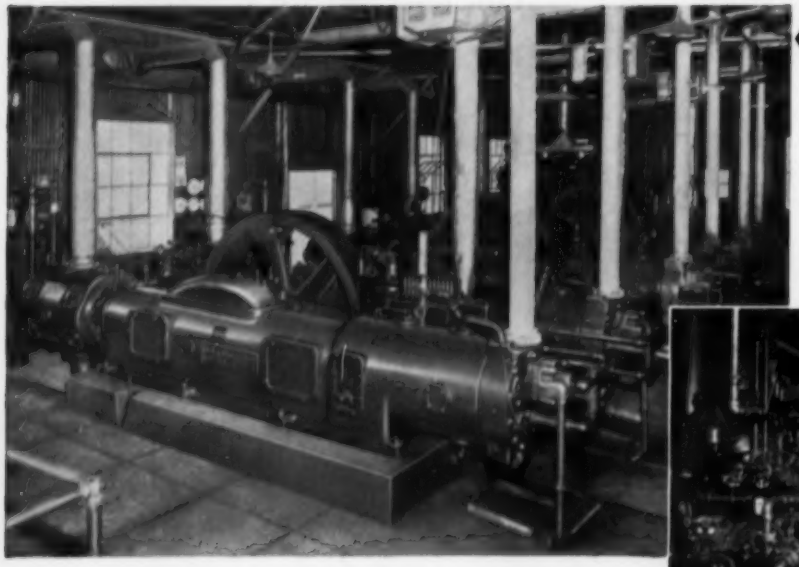
McK

ENGINEERS AND DESIGNERS OF EQUIPMENT FOR THE AUTOMOTIVE, FABRICATING AND STEEL INDUSTRIES

I-R 4-CYCLE GAS-ENGINE COMPRESSORS

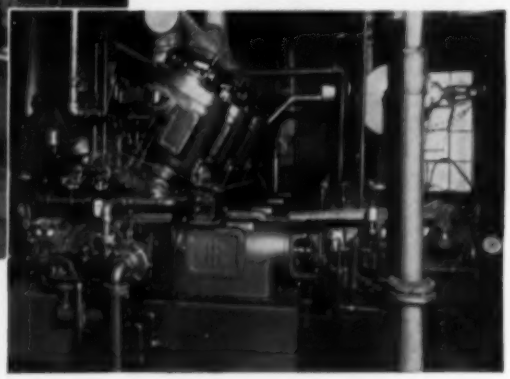
BURN AND COMPRESS

COKE-OVEN GAS



These four XG gas-engine compressors, of Ingersoll-Rand's earliest single-unit design, were installed around 1930 in the Ironton coke plant. After 25 years of service, they are still in daily operation, burning and compressing coke-oven gas.

This Ingersoll-Rand XVG gas-engine compressor (predecessor of the present SVG design) was installed in 1937, and is now carrying the primary coke-oven gas load at the Ironton plant.



. . . they've been doing it successfully

for 25 YEARS

at U.S. Steel's Columbia-Geneva Steel Division

The use of Ingersoll-Rand, 4-cycle gas engine compressors for handling coke oven gas, in both the power and compressor cylinders, dates back to one of the earliest installations of this type of equipment.

Here at the Ironton plant of U. S. Steel's Columbia-Geneva Steel Division in Utah, we have proof of the successful performance of I-R units in coke oven gas service over a period of about a quarter of a century. The units shown above are all still in daily operation, burning and compressing coke oven gas.

Ask your Ingersoll-Rand representative for the cost-saving advantages of I-R *4-cycle* gas-engine compressors in any type of coke-oven gas or natural gas service.

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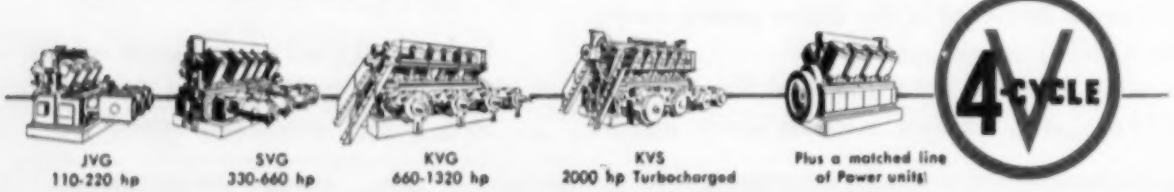

JVG 110-220 hp | SVG 330-660 hp | KVG 660-1320 hp | KVS 2000 hp Turbocharged | Plus a matched line of Power units!

Guided Missile Spending

(Millions of dollars)

Fiscal Year Ending June 30	Total Defense Department	Air Force	Navy	Army
1957*	$1,276.0	$799.0	$177.0	$300.0
1956*	918.0	485.0	172.0	260.0
1955	631.0	305.0	175.0	150.0
1954	503.5	175.9	141.1	186.6
1953	295.0	81.1	94.8	119.1
1952	168.9	66.4	56.1	46.4
1951	21.0	15.5	5.1	.4

Sources: Aircraft Industries Association and Defense department
*Estimated

Boom in Missiles

The U. S. will pour $918 million into them this fiscal year. Compared with what's ahead, it's a trickle. Here's how to prepare to get your share of the business

"GUIDED missile procurement will be highest in our history in fiscal 1957, increasing by more than one-third over 1956 and about double the amount spent for that purpose during 1955," President Eisenhower pointed out in his January budget message to Congress.

The missile boom evidently is on, but present buying may look like peanuts in two or three years. By then, the Air Force alone may be spending double the amount all three services will put out for missiles in the coming year.

Zoom! — Says one Air Force spokesman: "By fiscal 1959, we expect to use 35 per cent of our procurement dollars for missiles." That compares with about 20 per cent in fiscal 1957, 12 per cent in fiscal 1956 and only about 4 per cent back in 1952. The 1959 estimate looks even more impressive in the light of a recent statement by Air Force Secretary Donald A. Quarles. He says that the Air Force in fiscal 1958 will be asking $23.6 billion, compared with $16.5 billion in fiscal 1957.

The other services will also step up missile buying. The Army already is spending 55 per cent of its procurement budget for missiles. No percentage figure has been stated by the Navy, but the same upward trend is involved.

Long Range — One major producer figures the missile program will continue to expand rapidly for the next 25 years. Other estimates of rapid expansion range from 10 to 50 years.

Where does metalworking fit in? To give you an idea: Aerodynamics, radar, electronics, telemetering, servomechanisms, gyros, computers, thermodynamics, combustion, metallurgy, propulsion and chemistry contribute to a successful guided missile.

What It Takes — It's estimated that some 50,000 subcontractors and suppliers work for the aircraft industry. Many of them do missile work. About 80 per cent are small businesses, employing less than 500. If you add in the suppliers' suppliers, there may be 100,000. Among them, they split the hundreds of millions of dollars being spent annually on missile subcontracting.

Much of the work entails basic metalworking production techniques, like forging, stamping and machining, though high precision is usually a must. You probably already have the experience needed. A good way to break in: Concentrate on and sell your own specialty. You can always branch out later. Some hints were given in STEEL, June 18, p. 137-139.

Come On In—To get a part of the business, one prime contractor lists these as the most important qualifications: 1. A skilled team covering research, production, inspection and testing, plus the necessary facilities. 2. Integrity and a top performance record. 3. Sound financial and organizational structure. 4. Willingness to assist the prime contractor in the development of low cost, high quality products and to aid in product refinement through continual improvement of manufacturing techniques.

Expect plenty of help and supervision from the prime contractor. His success depends upon your performance. Here's a typical prime contractor's program for subcontractors:

1. Field teams help out on problems in production, interpretation of specifications, material handling, securing materials, co-ordinating engineering changes and inspection.

2. The contractor's management is available to the subcontractor. Key people visit the subcontractor's plant. In some cases, representatives are assigned semipermanently.

3. Subcontractors are invited to meetings on quality control, tooling, material conservation and manufacturing. Specialists in each field give the latest information to help solve problems.

4. The prime contractor periodically reviews performance and progress. Analysis of production control data gives warning of delivery slowdowns. Task forces help find the solution before production is delayed.

Expect plenty of competition. One company states: "Missile work

is the most competitive we have experienced in any contracting for the government; much of it is on a prototype basis, and contractors sense tremendous production orders to come. They are doing prototype work at a loss, hoping to get the inside track on the volume contract. On one prototype job we charged the government only $120,000; the cost was $400,000." Other firms agree with the competitive aspect, but say: "Development and prototypes are not necessarily done at a loss."

Gamble—Another adds: "Prime contractors do not encourage taking work at a loss because prospects for the recovery of any financial loss are not good usually."

The best way to get into the missile business is through a prime contractor. Contact his purchasing department or subcontracting division. A second way: Contact Army, Navy and Air Force through regular procurement channels.

You can work your own way into the missile business. Hicks Corp., Boston, developed and produces a flame deflector for the Navy that prevents accidental ignition of boosters while missiles are stored on board ships.

Infancy—Research and development spending will continue to be heavy. John J. Crowley, director, guided missiles, Office of the Assistant Secretary of Defense (applications engineering), states: "Research and development spending for missiles is already of the same order as spending for aircraft, and guided missiles are still in their infancy."

STEEL has compiled the following table of planned obligations for missile research and development by the Defense department from Aircraft Industries Association and the Bureau of the Budget:

1957	$224.4 million
1956	$268.0 million
1955	$214.0 million
1954	$231.4 million

If you get into the missile business, expect strong insistence that production schedules be met, continuous changes to improve design, constant emphasis on the importance of reliability.

Whoosh!—Evidence of the speed with which the missile program is moving: Within 24 hours after a new Nike plant at Charlotte, N. C., was dedicated, it was announced that plans had been made to produce a newer top secret missile there.

Says Eger V. Murphree, special assistant to the secretary of defense for guided missiles: "It is typical of missile developments that as soon as one type reaches a stage where it can be used for operational purposes it likely has become obsolete through improvements on the particular type mis-

Who Makes Missiles?

Missile	Manufacturer Operational Missiles	Service
AIR-TO-AIR		
Falcon	Hughes	USAF
Sparrow	Sperry	Navy
AIR-TO-SURFACE		
Petrel	Fairchild	Navy
SURFACE-TO-AIR		
Nike	Douglas and Western Electric	Army
Terrier	Convair	Navy
SURFACE-TO-SURFACE (AIR BREATHING)		
Matador	Martin	USAF
Regulus	Chance Vought	Navy
SURFACE-TO-SURFACE (BALLISTIC)		
Corporal	Firestone and Gilfillan	Army
Honest John	Douglas and Emerson Electric	Army
RESEARCH AND DEVELOPMENT MISSILE PROJECTS		
Atlas	Convair	USAF
Bomarc	Boeing	USAF
Jupiter	Chrysler	USA-USN
Navaho	North American	USAF
Nike B	Douglas and Western Electric	Army
Rascal	Bell	USAF
Redstone	Chrysler	Army
Snark	Northrop	USAF
Talos	Bendix	Navy
Tartar	Classified Project	Navy
Thor	Douglas	USAF
Titan	Martin	USAF
RESEARCH MISSILE VEHICLES		
Aerobee	Aerojet General	USN-USAF

Sources: Aircraft Industries Association and Defense department

sile itself, or through development of an improved missile for the same use.

"In all missiles, improvement in reliability is of utmost importance and represents a continuing research and development program. One of the real developments of this program will be to devise sensitive equipment which at the same time will be sufficiently rugged for the needs."

Chances — Says Aircraft Industries Association: "The problem of reliability is staggering. There are thousands of components involved in the operation of a missile. Even if you could build a missile with only 100 parts, each would have to have less than one chance in a thousand of failing for the missile to have better than 90 per cent reliability."

No wonder missile men worry more about the shortage of scientists and engineers than they do about any prospect that their work will be hamstrung by a shortage of funds.

Searches—Much work is being done on problems of heat and vibration. Also high on the research and development list: More miniaturization and reliable lightweight components; automatic assembly and cost cutting; faster output.

Experiments on the use of titanium, heat treatable stainless steels, the jet engine alloys, ceramics and plastics are going full speed ahead.

Sidelights — Another aspect of the missile business is equipment and construction. Missile men say they want tools that are versatile enough to handle many materials, those in use today and tomorrow.

Several missile builders are putting up new plants: The Convair Division of General Dynamics Corp. has a $40-million facility at Sorrento, Calif. Included are buildings with 1 million sq ft of floor space. Employment by 1958: About 6600.

A good share of the $30 million that Lockheed Aircraft Corp. will spend this year and next will go for new laboratories and a manufacturing setup for its Missile Systems Division.

The missile obviously is no fly-by-night. It's up to you to get your share of the business.

Looking for Subcontracts?

Prepare this info in advance:

1. WHAT ARE YOU EQUIPPED TO DO?

Call attention to previous experience in aircraft work, World War II subcontracting, other experience with Air Force, Navy or Army

2. HOW BIG IS YOUR PLANT? WHERE IS IT?

Include sizes of bays or other subdivisions, strength of floors, dimensions of exits

3. WHAT TOOLS AND EQUIPMENT DO YOU HAVE?

List makes, sizes, model numbers, capacities, age and condition of all power machinery and equipment available. Include that on order, plus processing, treating, plating and welding facilities. Also mention inspection and research facilities

4. HOW ABOUT PERSONNEL'

Include principal officers, a breakdown of production and other employees, proportion of skilled to unskilled workers, special skills, wage scales and labor resources

5. WHO ARE YOUR BANK AND CREDIT REFERENCES?

6. WHAT ELSE IS IN YOUR FAVOR?

Note transportation facilities (rail and highway), plant freight handling system, technical background, capacity available for additional work, plant security setup

Source: Aircraft Industries Association

Chrysler Gets Jupiter Contract

A $3,175,000 contract has been awarded to Chrysler Corp. for engineering and production work on the new Jupiter guided missile, announces the Department of the Army.

The Jupiter, which is being produced jointly by the Army as a ground-launched weapon and by the Navy for surface ship and submarine use, is an artillery type intermediate range ballistic missile. Effective strike distance is approximately 1500 miles.

Chrysler will continue production on the shorter-range Redstone missile, which has served as the basis for development of the Jupiter.

• An extra copy of this article is available until supply is exhausted. Write Editorial Service, STEEL, Penton Bldg., Cleveland 13, O.

PRODUCTION "at all time Peak"

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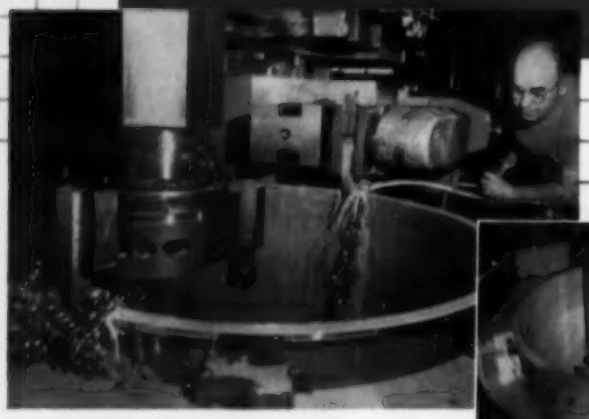
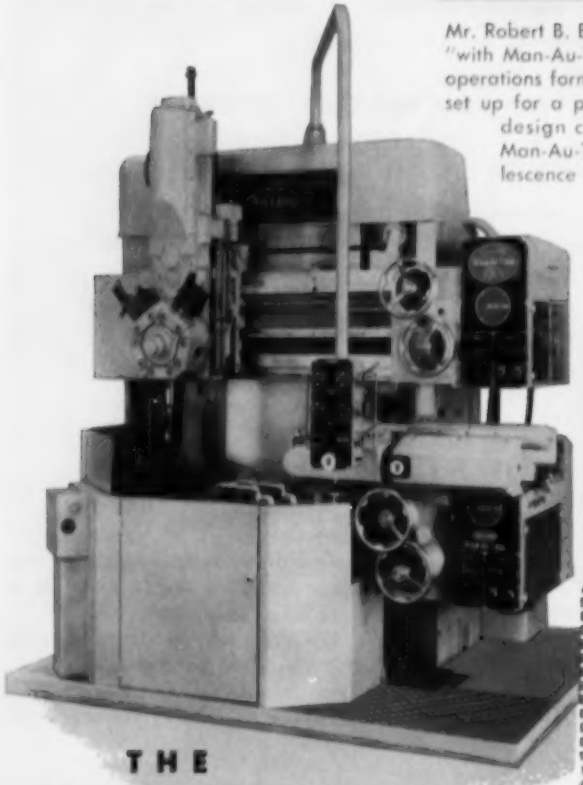
VERTICAL TURRET LATHE

MODEL 75

Solar Aircraft Company of Des Moines, Iowa and San Diego, California, has found the versatility and flexibility of the Bullard Man-Au-Trol V.T.L., Model 75 a distinct advantage in the machining and fabricating of various jet aircraft engine parts and assemblies.





Mr. Robert B. Ballard, Production Manager at Solar-Des Moines, reports that "with Man-Au-Trol, Model 75, it is possible to do a multitude of machining operations formerly requiring numerous expensive machines which had to be set up for a particular operation, so limited in scope, that an engineering design change either obsoleted the tooling or the machine. With Man-Au-Trol, Model 75, because of its wide range of functions, this obsolescence is greatly reduced — if there is a design change, only a new set-up is made — not the purchase of a new multi-thousand dollar piece of machinery."

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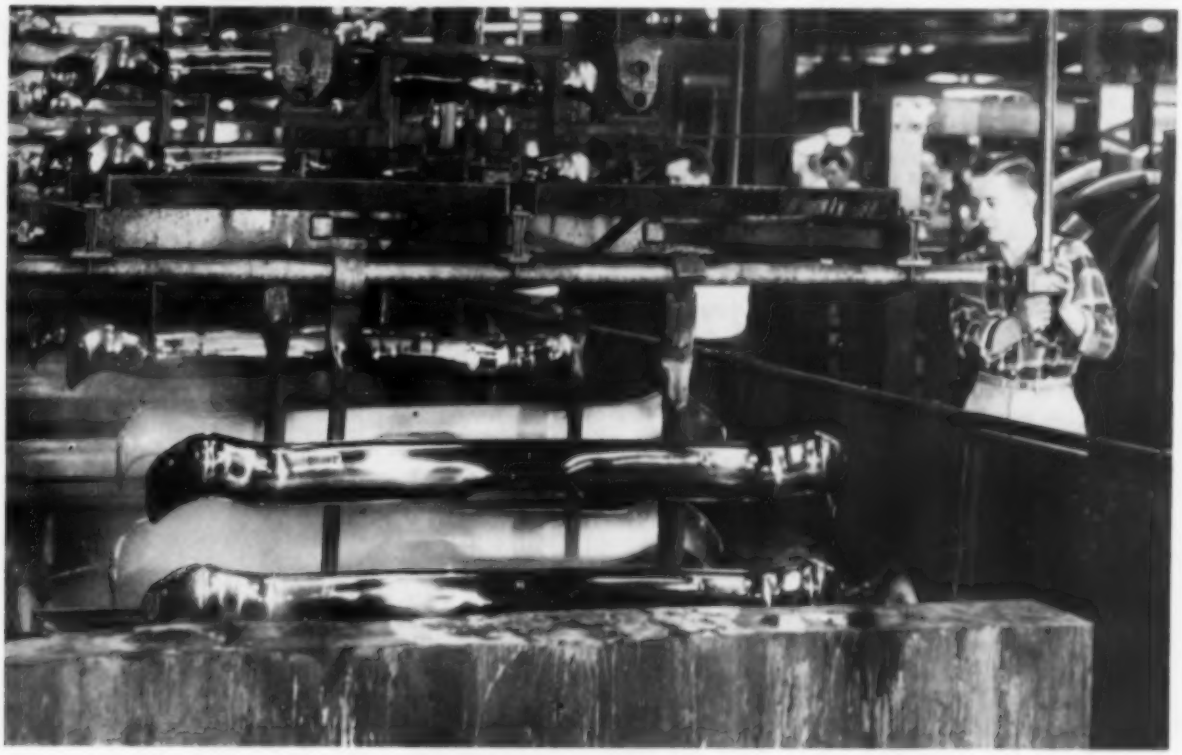

Production plating Chrysler bumpers at Electric Auto-Lite Co., Toledo, O.

Coming: Plating Standards?

Your bumper can be plated 70 different ways. SAE hopes to prune choices to a dozen. Move would pay off for platers and equipment makers. You might get better chrome

THE AUTO industry may adopt a set of standard chrome plating specifications. The subject is being considered by the Society of Automotive Engineers' subcommittee on electroplating.

Donald M. Bigge, subcommittee chairman, says: "We'll attempt to have the specs ready for the 1957 SAE Handbook." Mr. Bigge is managing engineer, chemical engineering department, Chrysler Corp. Engineering Division.

Advantages — He explains that standard electroplating specifications would have these advantages: 1. Suppliers can turn out parts for several companies without installing extra equipment. 2. Equipment makers can standardize plating units for simplified installation.

Each company now has its own standards for exterior and interior plated parts. Supplier firms run into the problem of adjusting plating methods to satisfy two or more sets of specifications.

Example—One vendor found it was plating similar parts for Ford Motor Co. and Chrysler. Both wanted the same total plate thickness, but Chrysler also set minimum limits for the thickness of the nickel coating. Ford had other tolerances. The supplier, trying to meet two different standards with the same equipment, satisfied neither company.

That's trouble enough, but firms which make plating equipment practically have to engineer each job separately. One set of specifications would allow them to standardize plating tanks, carriages and controls. It would lead to more automatic equipment, speed up processing and save money, declares Mr. Bigge.

Problem—Before such specs can be drawn up, it's necessary to develop a standard plating test which will predict and duplicate service conditions. Present tests take too long, and don't check for copper and iron particles in the air which cause more corrosion than is suspected.

Project 15, undertaken by the American Electroplaters Society (AES), is working on two methods of testing. Mr. Bigge thinks one of them (Test 20) probably

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will be adopted within a year.

Test 20—The test is based on Chrysler's formula 59, announced last year. Biggest advantages are that it closely duplicates service wear and takes about 20 hours. Salt spray tests in common use take 48 to 192 hours.

Copper nitrate, iron chloride and ammonium chloride are mixed with kaolin, a clay material which bonds the mixture to test parts. Coated parts are placed in a humidity oven where 100°F and 100 per cent humidity speed up the corrosion process.

Mr. Bigge claims the test spots substandard parts before they turn up on a customer's car. It means stock inventories don't pile up for days while salt spray tests determine whether parts are satisfactory.

Test 14—Buick Division, GMC, is using Test 20, but other GM divisions, led by C. F. Nixon, electroplating specialist, favor a salt spray test with acetic added to pick up corrosion quicker.

This system isn't as far along as Test 20, which Mr. Bigge hopes will get the nod from AES. He says it is thorough, yet simple enough so small companies can use it without calling in expert assistance.

When AES does decide, Mr. Bigge thinks it's likely that the American Society for Testing Materials (ASTM) will adopt the test as standard. He hints that most of the men on the SAE subcommittee also are active in project 15 and the ASTM.

Satisfaction — With a standard test, Mr. Bigge says it will be relatively easy for the SAE group to arrive at plating specifications which will satisfy all auto companies.

Interior plated parts call for different plating thicknesses than exterior parts, which are subjected to heavier corrosion.

An alternate set of specs will be available for companies which want to use nickel-chrome plating rather than copper-nickel-chrome.

Cadmium—Standards also will be set up for cadmium and zinc plating, but they don't pose such difficult corrosion problems as chrome. While this still sounds like a wide sheaf of specifications, it narrows down the number of choices from more than 70 to about a dozen.

Thrifty—The specification also may help platers to maintain minimum thicknesses of nickel, which means welcome material savings, declares Mr. Bigge.

He indicates that no adequate substitutes for nickel have been found, but research departments are working on combinations and alloys which will cut the amount of nickel needed.

Bright—One supplier has worked out a process which uses semi-bright and bright nickel baths.

Some companies are turning to white brass, a copper-zinc alloy, as a partial nickel substitute. It isn't too satisfactory, says Mr. Bigge. High zinc content in the alloy keeps out red rust, but white specks of corrosion thrive. The alloy also tends to be brittle. Deposits have to be light or the coating will split and curl.

Tightrope—"White brass with 40 per cent copper content comes close to some of the properties of nickel, but it's hard to control the alloy mix that closely," he asserts.

Iron chromium is a better substitute, but it won't be on the market for another five or six years. By that time the nickel shortage may have eased or better allocation systems will have been set up.

U. S. Auto Output

Passenger Only

	1956	1955
January	612,079	659,508
February	555,596	675,495
March	575,234	794,015
April	547,766	753,851
May	471,994†	724,892
5 Mo. Total	2,762,669†	3,607,761
June		649,393
July		659,763
August		614,493
September		461,591
October		517,813
November		749,061
December		682,257
Total		7,942,132

Week Ended	1956	1955
June 2	77,451	125,018
June 9	105,074	134,673
June 16	100,804	139,743
June 23	105,243	151,249
June 30	102,042†	158,402
July 7	60,500*	134,092

Source: *Ward's Automotive Reports*
†Preliminary *Estimated by STEEL

Ford Builds Plating Line

Two 710-ft bumper plating lines are being installed at Ford Motor Co.'s South Monroe, Mich., part plant. Udylite Corp., Detroit, is doing the work. Construction calls for 1200 tons of plate and structural steel.

E. L. Van Wulfen, Udylite's project manager, believes the lines are longest in the auto industry, although Chevrolet boasts three lines which are about 500 ft long. He adds that the first machine will be operating by February, 1957. Both units are scheduled for completion in June, 1957.

Bumpers will go through copper, white brass, nickel and chrome plating tanks. Ford has no comment on its use of white brass. It's understood that bumpers will get a 30-minute plate in white brass, an 8-minute dip in nickel.

Hourly capacity is rated at 35 racks (420 bumpers) per machine. Carriages are hydraulically operated, reports Mr. Van Wulfen. A two speed programming system allows racks to by-pass different sections of the line when desired.

Pull-out stations will be installed behind the copper plating tanks, so bumpers can be withdrawn for easy inspection. A push-pull down draft ventilator draws fumes beneath the lines and discharges them through antipollution air scrubbers.

Zink Likes Magnesium

Dow Chemical Co., Midland, Mich., says that magnesium played a big part for the first time this year in the Indianapolis classic. Magnesium wheels were standard equipment on all cars in the race.

The John Zink Special, this year's winner, also used substantial amounts of magnesium in body panels, transmission and other castings. Result: Its weight was lopped from 1880 lb to about 1700 lb. During qualification trials, the car set a course record of 145.6 mph.

A
ROTOR
When a manufacturer of hydraulic pumps switched from 8620 steel to Copperweld 8620 Leaded Steel, the life of a set of tools was increased 33⅓% from 7200 pieces to 9600 pieces.
Q
A
GEAR
This complex gear, part of the gear assembly for The Frank G. Hough Company's "Payloader," is made in 6 separate operations or set-ups with a tooling sequence of 13 operations. When they switched from unleaded steel to Copperweld Leaded 8620, the faster feeds and speeds gave them a production increase of better than 25%. In addition, tool life increased 60%.
K
KNOCKOUT PUNCH
When the Greenlee Tool Company switched to a Copperweld Leaded Alloy for this knockout punch, their spindle RPM on operations involving turning, drilling, milling and grinding increased 30%, and their tool feed from .005" IPR to .009" IPR.
Q

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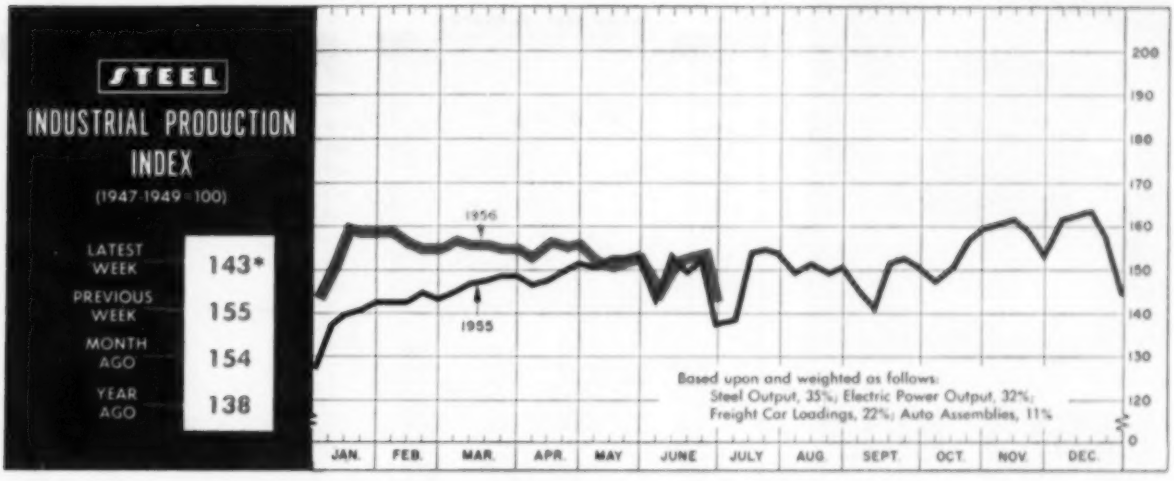
STEEL
INDUSTRIAL PRODUCTION INDEX
(1947-1949=100)
LATEST WEEK 143*
PREVIOUS WEEK 155
MONTH AGO 154
YEAR AGO 138
1956
1955
Based upon and weighted as follows:
Steel Output, 35%; Electric Power Output, 32%;
Freight Car Loadings, 22%; Auto Assemblies, 11%
JAN. FEB. MAR. APR. MAY JUNE JULY AUG. SEPT. OCT. NOV. DEC.
200 190 180 170 160 150 140 130 120 0

*Week ended June 30

Electric Output Helps Stabilize Economy

OUTPUT of electric power has been and will continue to be one of the most stable elements in our economy, despite the steelworkers' strike. It is one of the most dynamic forces underlying the nation's growth pattern.

Weekly generation of electricity by the electric utility industry (as reported by Edison Electric Institute) is beginning its summer climb and soon will surpass the record of 11.614 billion kw-hr (set during the pre-Christmas week last year). It will pass the 12 billion kw-hr mark for the first time late in July or early in August. On a monthly basis, output will set a record of more than 54 billion kw-hr in August, far exceeding the present high—51 billion plus in January. Another record will be set in December, and the annual total from all sources will reach close to 699 billion kw-hr, 12 per cent greater than 1955. This will reflect good business and create good business for metalworking.

Steady as Stars—Predictions are based on an output pattern which, year to year, runs almost as true as the stars. Strikes or other disasters have little effect on it. During the last serious steelworkers' strike in 1952, utility companies still had an increase in demand for power which hit its customary peak in August. Since then, the summer upsurge has grown stronger because of the increased sales of air conditioners.

Basic to this growth pattern is our rising population. In the last five years, we have gained between 13 million and 14 million. The element which makes power output dynamic is the increase in consumption per capita. In 1950, the figure was 2582 kw-hr per person. Last year it was 3828 kw-hr. This year, per capita consumption will be about 4200 kw-hr.

Reasons—We're using as much electricity in one day as we did in six days in 1929. Consumer purchases of electric appliances, especially air conditioners, account for much of the increase. Indus-

BAROMETERS OF BUSINESS

	LATEST PERIOD*	PRIOR WEEK	YEAR AGO
INDUSTRY			
Steel Ingot Production (1000 net tons)[2]	345[1]	1,822[1]	2,073
Electric Power Distributed (million kw-hr)	11,400[1]	11,478	10,138
Bituminous Coal Output (1000 tons)	10,225[1]	10,280	9,590
Petroleum Production (daily avg—1000 bbl)	7,050[1]	7,056	6,610
Construction Volume (*ENR*—millions)	$415.9	$443.5	$439.1
Auto, Truck Output, U. S., Canada (*Ward's*)	134,432[1]	139,823	195,071
TRADE			
Freight Car Loadings (1000 cars)	740[1]	799	696
Business Failures (Dun & Bradstreet)	265[1]	245	231
Currency in Circulation (millions)[3]	$30,485	$30,541	$30,021
Dept. Store Sales (changes from year ago)[3]	+6%	+12%	+6%
FINANCE			
Bank Clearings (Dun & Bradstreet, millions)	$23,295	$24,617	$21,756
Federal Gross Debt (billions)	$272.3	$275.6	$273.8
Bond Volume, NYSE (millions)	$14.1	$14.5	$19.7
Stocks Sales, NYSE (thousands of shares)	9,000	7,997	11,541
Loans and Investments (billions)[4]	$86.3	$85.2	$84.4
U. S. Govt. Obligations Held (billions)[4]	$27.1	$26.7	$32.3
PRICES			
STEEL's Finished Steel Price Index[5]	210.45	210.45	194.53
STEEL's Nonferrous Metal Price Index[6]	275.7	276.1	238.7
All Commodities[7]	113.8	114.0	110.0
Commodities Other Than Farm & Foods[7]	121.4	121.4	115.7

*Dates on request. [1]Preliminary. [2]Weekly capacities, net tons: 1956, 2,461,893; 1955, 2,413,278. [3]Federal Reserve Board. [4]Member banks, Federal Reserve System. [5]1935-1939=100. [6]1936-1939=100. [7]Bureau of Labor Statistics Index, 1947-1949=100

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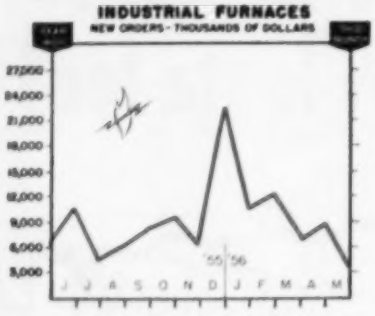
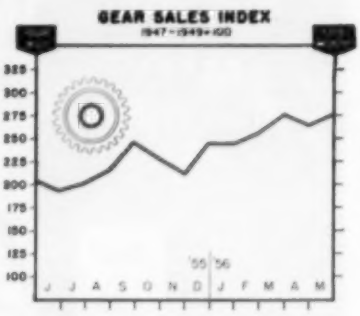
THE BUSINESS TREND



	1956	1955	1954
Jan.	10,244	4,973	3,643
Feb.	12,163	5,616	3,086
Mar.	7,025	7,345	4,079
Apr.	8,803	7,639	3,496
May	3,620	6,205	5,848
June	....	10,616*	5,663
July	....	4,338	1,664
Aug.	....	6,273	2,570
Sept.	....	8,351	2,534
Oct.	....	9,568	3,837
Nov.	....	6,180	3,188
Dec.	....	22,548*	6,847

*June includes $4,804,418 in steel mill furnace orders for first half. December includes $11,443,071 in steel mill furnace orders for second half
Industrial Heating Equipment Assn. Inc.
Charts copyrighted, 1956, STEEL.



	1956	1955	1954
Jan.	245.5	140.9	167.4
Feb.	256.2	148.5	165.1
Mar.	276.5	172.8	128.6
Apr.	264.7	179.8	156.2
May	275.6	205.2	132.5
June	....	193.5	127.4
July	....	201.7	141.3
Aug.	....	217.6	154.7
Sept.	....	246.5	135.1
Oct.	....	227.6	152.3
Nov.	....	210.4	116.7
Dec.	....	245.5	182.2

American Gear Mfrs. Assn.

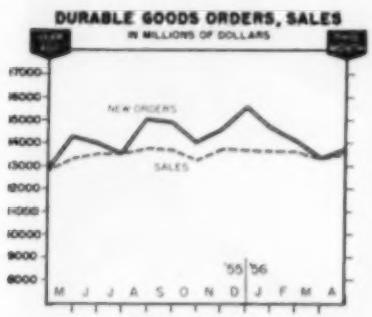
trial expansion is boosting demand for power. Automation is bolstering the uptrend. Greater use of electric furnaces in steel mills and increased nonferrous capacity are hiking demand.

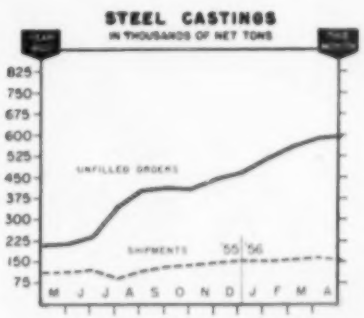
With those forces at work, utility officials talk in terms of doubling their capacity every decade. Such a program requires a great amount of electrical machinery, and this industry is consistently one of the strongest in metalworking. According to the Federal Reserve Board's production index for May, producers of electrical machinery were going at 206 per cent (seasonally adjusted) of the 1947-1949 base period. This was second only to April, which was revised to 209 per cent of the base. The huge capital expenditure program of American industry, which may hit $39 billion this year, will keep the figures at or above this level as long as manufacturers can get materials to produce the equipment.

Keeps Index High

Electric power output also has been the big factor in keeping STEEL's industrial production index at high levels despite cutbacks in other areas. Until the week ended June 30, the trend line was running along near the record level of late December and early January. In the first six months of the year, steel operations varied from 100.9 per cent of weekly capacity to about 74 per cent; auto and truck production went from a high of 174,712 units a week to as low as 94,917; freight car loadings fluctuated between 611,299 cars a week to 801,431. Most of the decreases came in the last two or three months. While electric output has fluctuated between 11.54 billion and 10.815 billion kw-hr, the trend has been the reverse of the other elements, resulting in a fairly even composite trend line (see chart, page 71).

But even air conditioners couldn't hold the line up for the week ended June 30. Steelmakers began banking their furnaces in preparation for the strike; auto production cut back as one maker ended its 1956 model run and others shut down to pare dealers' inventories; freight car loadings dropped off as the coal miners began a two-week holiday. But the preliminary 143 reading (1947-1949=100) for the week ended June 30 is only a prelude to the





	New Orders*		Sales*	
	1956	1955	1956	1955
Jan.	14,683	12,142	13,596	11,850
Feb.	14,107	12,170	13,593	12,029
Mar.	13,337	13,353	13,294	12,860
Apr.	13,679†	12,879	13,492†	12,805
May	.....	14,331	.....	13,322
June	.....	14,033	.....	13,527
July	.....	13,571	.....	13,503
Aug.	.....	15,145	.....	13,745
Sept.	.....	14,936	.....	13,692
Oct.	.....	14,094	.....	13,261
Nov.	.....	14,680	.....	13,721
Dec.	.....	15,605	.....	13,688

*Seasonally adjusted. †Preliminary
U. S. Office of Business Economics

	Shipments		Unfilled Orders*	
	1956	1955	1956	1955
Jan	158.7	98.2	519.4	201.8
Feb.	165.4	106.4	567.3	202.3
Mar.	170.0	127.5	595.0	215.1
Apr.	163.7	120.1	600.2	221.3
May	....	122.5	....	225.3
June	....	133.9	....	251.4
July	....	97.8	....	354.6
Aug.	....	126.4	....	413.5
Sept.	....	140.8	....	420.6
Oct.	....	145.7	....	418.1
Nov.	....	152.4	....	453.1
Dec.	....	159.0	....	475.3
Total	....	1,530.7		

*For sale. U. S. Bureau of the Census

big dip, which will not be felt to its fullest extent until later in July. (See STEEL, June 18, p. 97.) If the steelworkers' strike lasts six weeks or longer, as David J. McDonald, president of the steelworkers' union, says it could, even output of electric power will taper off as more and more metal-shy factories turn off the juice.

Furnace Orders Lag

Some of the heat has gone out of the buying spree for industrial furnaces (see chart, page 72). But it doesn't worry manufacturers much; they expected it. The slowdown in the automotive industry has been the big factor. Even so, business in the first five months of this year is 32 cent ahead of the corresponding period last year, and the industry is confident that it will be no less than 10 per cent ahead at the end of the year. An uptrend is expected to start next month. June and July will continue to show declines from year-ago figures, although June's figure will be somewhat higher than May's. (June and December figures each year include orders for steel mill furnaces during the preceding six months.)

Some of the automotive slack will be taken up by orders for the new zirconium facilities authorized by the government in early May. Stepped up aircraft buying by the government also will help fill any gap.

Buying Power Down

Lack of spending money is certainly no hindrance to the consumer these days. But the rise in prices he has to pay may be. Weekly take-home pay of factory production workers in May was at a record high for that month. Net spendable earnings of a worker with three dependents were $71.95 a week. This was 2.5 per cent above the figure for the 1955 period. It was about half a dollar less than in April, but that was because of the shorter work week in May.

The average worker lost about 1 per cent in the amount of goods and services he could buy with his pay. Consumer prices rose to 115.4 per cent of the 1947-1949 base period, matching the all-time high set in October, 1953. The increase was across the board. All elements in the Bureau of Labor Statistics' index either advanced or remained at the April level.

±.0004" is run-of-the-mill

Typical of the care that assures absolute uniformity in all Somers THIN STRIP is this 4-high mill equipped with the latest electronic gages and controls. Here thickness is constantly checked throughout the run, and maintained within ±.0004" or less on gages from .010" down. The slightest variation may be instantly corrected.

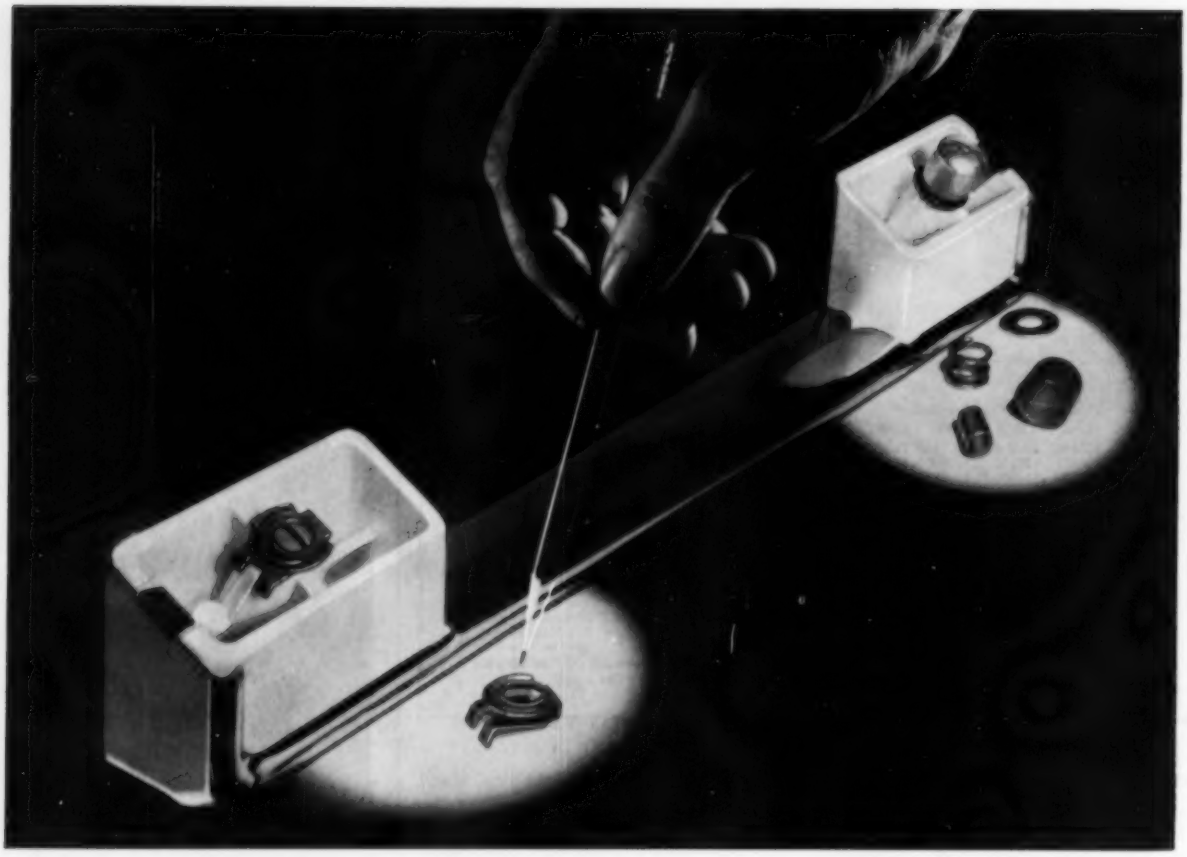
No matter how exacting your requirements may be for thin strip metal, you can depend on Somers quality control, equipment and experience to guarantee uniform quality every time—all the time.

Somers Brass Company specializes in rolling nickel and its alloys from .020", and copper and its alloys from .012" both down to .00075".

If you now have, or anticipate, a problem with exacting standards of this strip metal write:

FOR EXACTING STANDARDS ONLY
Somers

Somers Brass Company, Inc.
WATERBURY, CONN.



Engineered by Tinnerman...

One-Piece SPEED CLIP® replaces 4-part fastener, helps assembly and shipping... and saves money!

Four separate parts plus screw were required to fasten each end of the removable door handles on kitchen ranges manufactured by the Caloric Appliance Corporation, Topton, Pennsylvania.

Tinnerman fastening specialists teamed up with Caloric designers to eliminate 3 of the parts!

Now . . . a special one-piece, multi-purpose SPEED CLIP plus screw do the same job more efficiently and at lower cost, and reduce small parts handling. Faster, easier assembly . . . fewer parts to buy, inventory and handle. Packed inside the oven for safe shipment with SPEED CLIPS in place, the door handles are dealer-applied in far less time, can be easily removed by the housewife for cleaning.

The resiliency of the spring steel SPEED CLIP prevents crazing or chipping, enables it to absorb varying panel thicknesses and porcelain enamel build-up. Changeover was made without retooling or redesigning door handle or keyhole-shape mounting holes.

Find out now where SPEED NUT brand fasteners belong on your assembly line. There are more than 8000 variations to choose from. Call your Tinnerman representative for complete details and write for our Fastening Analysis Bulletin No. 336.

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TINNERMAN Speed Nuts

FASTEST THING IN FASTENINGS®

J. ROBERT JONES
. . . *Kearney & Trecker v. p.-sales*

ARNOLD S. GROT
. . . *Edward Valves chief metallurgist*

J. J. HITE
. . . *American Hoist engineering dir.*

J. Robert Jones was elected vice president-sales, **Kearney & Trecker Corp.**, Milwaukee. **H. W. Kippers** was named sales manager, standard machinery division. **Carl F. Enroth** was named to a similar post in the special machinery division.

Wellman Engineering Co., Cleveland, elected as vice presidents **H. C. Lynch**, engineered products; **W. F. Avery**, purchases; **Cresswell Ramsey**, production; **Ray Mack**, locomotive crane division; **John J. McGlone**, Williams Bucket Division; **F. J. Theisen**, production, and **W. L. Komph**, sales and engineering, Anker-Holth Division.

Lester R. Lindsley was made sales manager for **P. W. Voss & Associates**, Chicago.

Col. William L. McCulla, vice commander, Arnold Engineering Development Center, Tullahoma, Tenn., was named chief engineer of **Superior Steel Corp.**, Carnegie, Pa.

Percy S. Gough was made sales manager, **Crosby - Laughlin Division**, American Hoist & Derrick Co., at Portland, Me.

W. P. Blanchard was elected vice president-general manager, **Yuba Mfg. Co.** Formerly secretary-treasurer, he continues headquarters at Benicia, Calif.

Arnold S. Grot was named chief metallurgist at **Edward Valves Inc.**, East Chicago, Ind., subsidiary of Rockwell Mfg. Co.

E. R. Hall succeeds **Walter F. Perkins**, retired, as vice president and general manager, metal product division, **Koppers Co. Inc.**, Pittsburgh. **H. B. Cummings** was elected vice president and assistant general manager of the division.

Youngstown Steel Tank Co., Youngstown, named **Joseph E. Kindel** operations manager; **Karl H. Dressel**, sales manager; and **Robert M. Bentley**, chief engineer.

George H. Brodie was appointed director of engineering, **Kellogg Switchboard & Supply Co.**, Chicago, division of International Telephone & Telegraph Corp.

F. J. Evans Engineering Co., Birmingham, elected **J. K. Hawk** vice president-engineering; **N. B. Buehrer**, executive vice president; **D. M. Mills**, vice president-Houston division; and **Jack J. Tyson**, vice president-Atlanta division.

Robert J. Stock was made staff assistant to the vice president-engineering, **Allegheny Ludlum Steel Corp.**, Brackenridge, Pa. He is succeeded as works manager at the Watervliet, N. Y., works by **Arthur F. Schraeder**, former assistant manager of maintenance.

J. J. Hite was made director of engineering, **American Hoist & Derrick Co.**, St. Paul. **William Niessen** was appointed chief structural engineer and **Kenneth Potter**, chief mechanical engineer.

Food Machinery & Chemical Corp., San Jose, Calif., elected **Ernest Hart** president to succeed **Paul L. Davies**, now chairman and chief executive officer. **J. D. Crummey** was elected honorary chairman. Newly elected executive vice presidents are **Dr. Carl F. Prutton**, in charge of the chemical divisions; **James M. Hait**, former vice president, director of engineering and manager, ordnance division; and **John D. Fennebresque**, former vice president and assistant to the president.

At **Blaw-Knox Co.'s** construction equipment division, Mattoon, Ill., **L. H. DeVilling** was named sales manager; **Raymond E. Hoppenrath**, product manager-bins, batchers and buckets; **H. C. Peters**, product manager-truck mixers; **John Bunder**, product manager, concrete paving equipment; and **James H. Cougler**, product manager-bituminous equipment.

William A. W. Krebs Jr. was elected vice president, **Arthur D. Little Inc.**, Cambridge, Mass.

Macon Jordan was made product manager-tool steel sales, Cincin-

WALTER J. REINECKER

PAUL F. ANDERSON

STANFORD J. BARLETT

. . . Circo Equipment Co. appointments

nati plant area for **Solar Steel Corp.**

Hugh F. Colvin, vice president-general manager, was elected president of **Consolidated Electrodynamics Corp.**, Pasadena, Calif. He succeeds **Philip S. Fogg**, who remains as chairman. **Russell R. Palmer** was named sales manager.

Kaiser Aluminum & Chemical Sales Inc., Oakland, Calif., appointed **Alan DeRoss** as technical specialist in its pig and product office. He was formerly assistant plant manager and chief metallurgist for Advance Aluminum Casting Co.

William P. Possel was elected vice president-production and **E. M. Patterson**, vice president-research and defense product engineering of the Dayton, O., division of **Standard-Thomson Corp.**

Howard S. Manwaring was made director of engineering at **International Harvester Co.**, Chicago.

Jack P. Greer was made mid-central district manager, **Hyster Co.**, Portland, Oreg. He replaces **Walt St. Clair**, now assistant sales manager, eastern division.

Robert M. Fowler and **Hendrik de Wet Erasmus** were appointed research consultants at the Metals Research Laboratories of **Electro Metallurgical Co.**, division of Union Carbide & Carbon Corp., New York.

Circo Equipment Co., Rahway, N. J., appointed **Walter J. Reinecker** chief engineer, sonic division; **Paul F. Anderson**, purchasing agent, and **Stanford J. Barlett**, manager, washer division.

Goodwin Johnston, secretary-treasurer, **Macwhyte Co.**, Kenosha, Wis., was appointed to the new post of director of purchases. **William R. Kuessow** was made office manager.

Robert L. Gibbs was appointed general sales manager, **Mueller Brass Co.**, Port Huron, Mich. He was assistant general sales manager.

James A. Dunn was made manager of the Trenton, N. J., plant of U. S. Steel Corp.'s **American Bridge Division**. He succeeds **G. K. Manzer**, now in Pittsburgh as assistant to the director of industrial engineering.

John P. Buck was elected vice president - manufacturing, **Maremont Automotive Products Inc.**, Chicago. He is succeeded by **Tom Browne** as manager of the Harvey, Ill., plant.

Duncan Gardiner was named director of research and development for **Vickers Inc.**, Detroit.

Harold A. Muttach, division superintendent of coke ovens, blast furnaces, open hearths and foundry for **Granite City Steel Co.**, Granite City, Ill., assumes additional duties as assistant to the vice president-operations. **Frank J. Burgert** was made assistant to Mr. Muttach. **L. Ovid Sperry** replaces Mr. Burgert as superintendent of the North plant.

John V. Banks was made production manager of **Kaiser Steel Corp.'s** fabricating division, Montebello, Calif., plant.

Norman E. Bartholomew was made Detroit district sales manager, **Kelite Corp.** He was formerly Detroit sales supervisor.

E. A. Nave was appointed sales manager, fabricated products, metals division, **Olin Mathieson Chemical Corp.**, at East Alton, Ill.

E. C. Row was elected president, **Chrysler Export Corp.**, Detroit, to succeed the late **C. B. Thomas**. Mr. Row retains the presidency of Chrysler Corp. of Canada Ltd.

C. R. Welles was made sales manager for **Hanna Furnace Corp.**, Ecorse, Mich., division of National Steel Corp. He was eastern district sales manager.

William E. McCoy was made sales manager of **Caterpillar Tractor Co.'s** Southwest division with headquarters in San Francisco. He succeeds the late **Bernard L. Hagglund**. He was eastern division sales manager.

Edward N. Clark was made assistant to the factory manager, cutting tool and gage divisions, **Pratt & Whitney Co. Inc.**, West Hart-

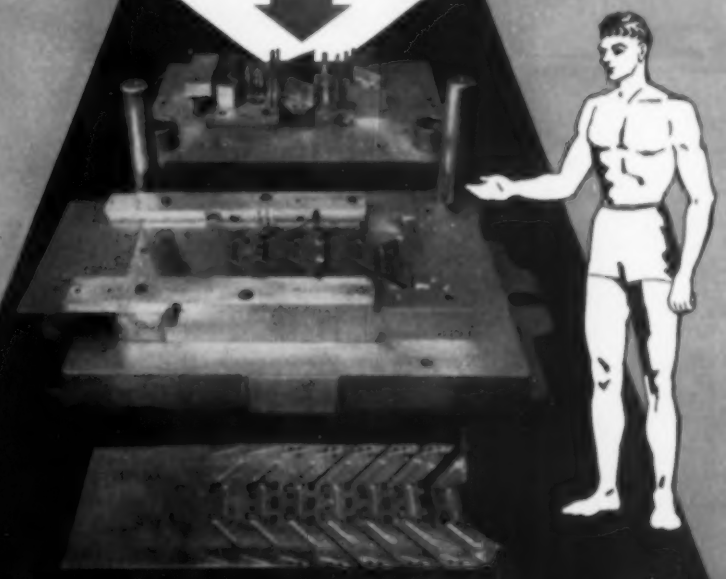
Here's why . . .

Mason, Shaver & Rhoades, Inc.
East McKeesport, Pa.

used **DESEGATIZED®**

Olympic FM

DIE STEEL
for this die



Eight-station progressive die made from Olympic FM by Mason, Shaver & Rhoades, Inc. Die is used to produce mounting brackets for lighting fixtures from .041 cold rolled steel.

1. Olympic FM is easier to machine, especially in milling and shaping.
2. Olympic FM produces a better finish and does not tear.
3. Improved tool life noted when using Olympic FM.

● Latrobe's Olympic FM high carbon-high chromium die steel has consistently produced superior machined finishes, lowered die production costs, and resulted in longer production runs than comparable type die steels. One of Latrobe's many DESEGATIZED® steels, Olympic FM is a free machining die steel . . . its improved free machining characteristics resulting from the addition of alloy sulphides uniformly dispersed by the DESEGATIZED® process of manufacture.

Specify Olympic FM for your next die . . . over 250 sizes stocked in conveniently located warehouses throughout the country.

LATROBE STEEL COMPANY

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Branch Offices & Warehouses Located in Principal Cities

ford, Conn. **Ralph Winspear** was made superintendent, cutting tool division.

Edward K. Paul fills the new post of administrative assistant to the vice president-general manager, **Bell Aircraft Corp.**, Buffalo.

R. W. Todgham was appointed executive vice president, **Chrysler Corp. of Canada Ltd.**, Windsor, Ont.

Crane Co., Chicago, appointed **Thomas D. Kelly** midwest district manager and **Darrell R. Nordwall**, manager, east coast district. **Charles H. Lovelace** was made manager of valve and fitting sales.

Wagner Bros. Inc. appointed **Kenneth Edstrom** district manager of its new Cincinnati branch, covering southern Ohio, Kentucky, Tennessee, Virginia and West Virginia.

Philip E. Gordon was made Los Angeles district sales manager for **Latrobe Steel Co.**

Harry G. Stubbs joined Rockwell Mfg. Co.'s **Delta Power Tool Division** as Detroit district sales manager. He replaces **George G. George**, recently appointed to Delta's new specialty sales department.

Frank Kelsey was appointed sales manager of a newly opened eastern sales office for **Molded Fiber Glass Co.** and **Molded Fiber Glass Sheet Co.**, Ashtabula, O. The office is at 429 Howe Ave., Passaic, N. J.

Anaconda Co., New York, elected **John B. Knaebel** assistant to the vice president in charge of mining operations.

Rowland H. Archer was made superintendent of **Buick Motor Division's** sheet metal stamping plant, Flint, Mich. He succeeds **A. Richard Middleton**, retired.

CARL W. PETERSEN

EARL WEDLAKE

. . . Dodge Mfg. executive appointments

Carl W. Petersen was elected executive vice president, **Dodge Mfg. Corp.**, Mishawaka, Ind. He was vice president-works manager. **Earl Wedlake** was elected vice president in charge of production and purchasing. **Lloyd F. Lamm**, vice president-general manager, Chicago Thrift-Etching Corp., subsidiary, was elected its president.

William A. Anthony joined **Gas Machinery Co.**, Cleveland, to head engineering and sales of a new line of continuous mixers. **Francis C. Schaffer** joined the firm in research and development. **Hjalmar A. Anderson** was made a sales engineer, industrial furnace division.

Chicago Aerial Industries, Melrose Park, Ill., appointed **Joseph A. Mathews** manager of its potentiometer division. He formerly was chief engineer for Central Electric Co.

Duraloy Co. appointed **Milton H. Perry** southeastern district sales manager with headquarters in Atlanta.

In **Twin Coach Co.'s** aircraft division, Buffalo, **Stuart N. Smith** was named vice president-manufacturing; and **George R. Hecht**, vice president-contracts administration.

Leonard H. Clark was made assistant to vice president-sales, a new post at **Standard Pressed Steel Co.**, Jenkintown, Pa.

Robert N. Lynch was appointed sales manager, **Industrial Heating Equipment Co.**, Detroit. He was formerly sales manager of Park Chemical Co.

John W. Pike was made eastern district manager of **Struthers Wells Corp.**, Titusville, Pa.

G. N. Stuart was appointed production manager of brass strip operations at the **Western Brass Mills**, division of Olin Mathieson Chemical Corp., New Haven, Conn.

At **Ford Division**, Ford Motor Co., Dearborn, Mich., **Sanford Kaplan** was made executive assistant to the general manufacturing manager and **Donald J. Bastian**, plant operations manager.

OBITUARIES . . .

Harold D. North, 73, chairman, **Ferry Cap & Set Screw Co.**, Cleveland, died June 20.

William R. Westphal, 64, president, **Flour City Ornamental Iron Co.**, Minneapolis, died June 21.

Leon Goodwill, 44, sales manager and industrial director, **Douglas Bros. Ltd.**, Montreal, Que., died June 19.

Raymond E. Christie, 73, vice president, **Crucible Steel Co. of America**, died in New York June 27.

M. L. Noel, 50, president, **Frantz Tractor Co. Inc.**, New York, died June 20.

If You Buy Acids or Other Chemicals in Tank Car Loads···

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Chemicals covered: Liquid Alum, Aluminum Chloride, Muriatic Acid, and Phosphoric Acid

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Chemicals covered: Aqueous Ammonia, Lime Sulfur Solution, Sodium Silicate Solution, and Sodium Sulfide, Liquid

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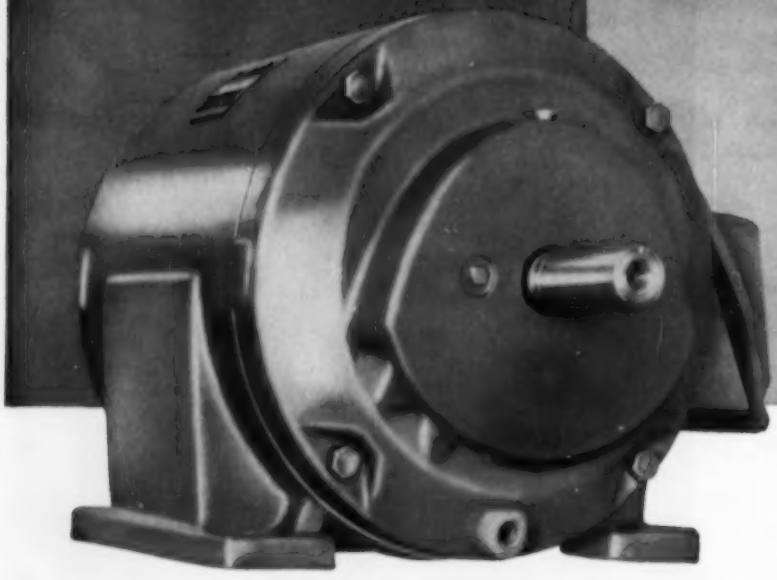

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The total protection concept of design and construction armors Reliance A-c. Motors against everyday hazards, with little or no maintenance. Total protection is made up of extra features like:

Slot cell insulation of Double Backed Mylar

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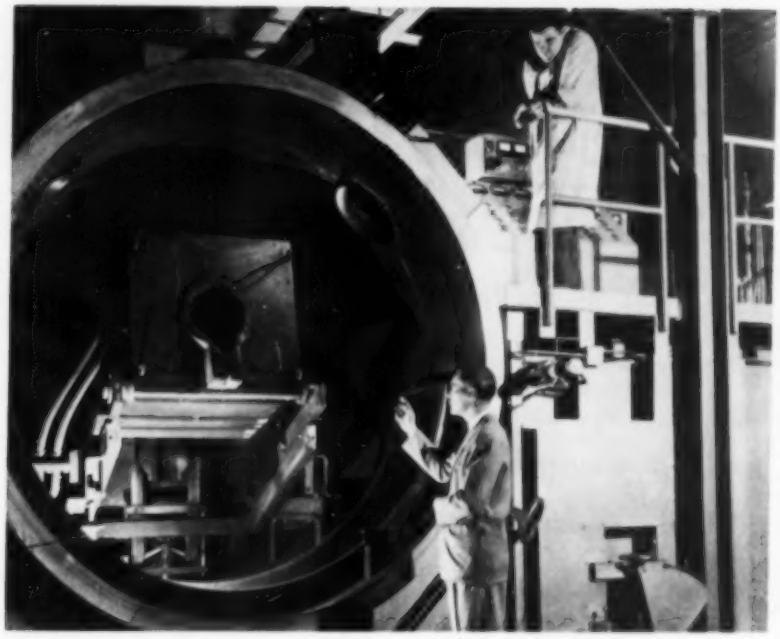


Allegheny Ludlum installs induction vacuum melting unit as . . .

Superalloy Demand Rises

A NEW induction vacuum melting facility is in operation at Allegheny Ludlum Steel Corp.'s plant in Watervliet, N. Y. It will be converted to production status as soon as a number of research studies are completed.

The facility complements the consumable electrode vacuum remelting department at the plant (STEEL, June 11, p. 145).

Investigation — Extensive research and development programs on high temperature turbine wheel and bucket alloys are in progress. High temperature bearing steels, tool steels, alloys for magnetic applications and alloys for specialized corrosion service also are being studied. Information gained is expected to contribute much to the operation of the facility as a production unit.

The 300-lb experimental furnace is shown in the accompanying picture. It will be replaced with a 2000-lb production unit later this year. All controls are operated from the console on the upper right.

Design of the unit permits charging the furnace, pouring ingots and removal of the completed heat while the vacuum is maintained in the main melting chamber. A succession of melts can be made, with melting being stopped only for crucible changes.

The melting operations are carried on under carefully controlled conditions of pressure and temperature. Chemical composition is controlled by sampling and spectroscopic determination of the percentage of metallic elements present. Reactions between gases and the melt are controlled by using a mass spectrometer which qualitatively determines the amount of all gases present in the vacuum system at any given moment. Temperature of the melt and pressure of the system are continuously recorded by high speed electronic equipment.

Mac Dermid Broadens Service

Mac Dermid Inc., Waterbury, Conn., established a new customer service laboratory, which has the latest in metal finishing techniques and materials. The company's engineers can duplicate the processing cycle of virtually any metal finishing plant under rigid controls. Through this service, manufacturers will be able to analyze and solve metal cleaning, plating and finishing problems before the costly production stage is reached.

Enters Automotive Part Field

Warren Mfg. Corp. has been organized in Warren, Pa. The firm will manufacture automotive parts, especially those used in freight, petroleum and chemical hauling. Operations are expected to begin within the next few months. Clifford R. Bates is chairman of the board.

National-Standard Expanding

National-Standard Co., Niles, Mich., is constructing a 22,000 sq ft addition to its plant, supplementing 366,000 sq ft of manufacturing space. The firm makes tire bead wire, high carbon flat steel, wire cloth, special machinery and a variety of fine wires.

Aeronautical Lab Enlarged

Robertshaw-Fulton Controls Co., New York, is constructing a laboratory building at its Aeronautical Division, Anaheim, Calif. Increased space and more facilities for apparatus suitable for guided missile applications will be provided. The division develops and manufactures instruments and control devices for aircraft, missiles and ordnance equipment.

Axelson Sales Co. Formed

Axelson Sales Co. has been organized at 2499 Huntington Dr., San Marino, Calif., to handle the sale of machine tools and accessory lines.

Fabricator Opens Plant

Tube Manifold Corp., North Tonawanda, N. Y., opened an 82,000 sq ft plant for the fabrication of tubular products. Its equipment includes automatic copper brazing furnaces using hydrogen atmospheres, a complete conveyorized material handling system and other facilities providing a continuous flow production layout. Facilities include automated equip-

ment for heat treating, salt bath, spot welding, stamping, sand blasting, induction, machining, pressure testing, grinding, tube spinning, bending, welding and brazing, and baked-on paint finishing.

Buffalo Fabricator Builds

Vento Steel Products Co. Inc., Buffalo, plans to build a plant in Cheektowaga, N. Y. Containing about 50,000 sq ft, it will cost $250,000 to $500,000. The firm makes steel windows.

Tyron Inc. Organized

Tyron Inc., 42 Brookford St., Cambridge, Mass., has been organized. It will do industrial research and development work on mechanical and chemical processes, also manufacture them. Officers are: Dr. Harold S. Mickley, president; E. P. Neumann, executive vice president; Stanley Heck, treasurer.

Illinois Firm Expanding

Frank G. Hough Co., Libertyville, Ill., has launched an expansion program which will add 20 per cent to its plant facilities. The firm, a subsidiary of International Harvester Co., makes pneumatic-tired tractor-shovels.

Specializes in Fabrication

Lofstrand Co., Rockville, Md., recently acquired by New York Wire Cloth Co., York, Pa., will be developed as a specialist in metal fabrication. Lofstrand facilities include a wide variety of machine tools, stamping presses, welding and foundry equipment.

Develops Asbestos Property

Lake Asbestos of Quebec Ltd., a wholly owned subsidiary of American Smelting & Refining Co., New York, awarded a $7.7-million contract to F. H. McGraw Co. of Canada Ltd. for construction of an asbestos ore milling plant. It will be capable of treating 5000 tons of ore per day. More than $9 million will be spent for the structure and milling machinery. AS&R expects to spend more than $32 million to develop this asbestos property.

Foundry Leases Plant

Alloy Precision Castings Co. leased a 23,000-sq-ft plant at 3855 W. 150th St., Cleveland. All production facilities from factories at E. 45th street and Hamilton avenue and at 13721 Bennington Ave., both in Cleveland, will be moved to the new plant.

Buys Milling Machine Firm

Crowningshield-Harris Co. Inc., Greenfield, Mass., manufacturer of milling machines, has been purchased by a group headed by F. J. Sweeney, president, and D. J. Sweeney, sales manager.

Steel Co. of Canada Expands

Steel Co. of Canada Ltd., Hamilton, Ont., awarded a contract for the expansion of cold mill finishing facilities at its Hamilton Works to Dominion Bridge Co. Ltd., Montreal, Que. Cost: More than $1.25 million. Buildings will be erected to house a cold reversing mill and annealing facilities; coil storage facilities and a pickle aisle; a temper mill; and coil storage.

Lindberg Expanding Plant

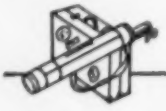
Lindberg Steel Treating Co., Melrose Park, Ill., is building an addition to its plant. Cost: $250,000.

ASSOCIATIONS

Resistance Welding Alloy Association has been organized. Its offices are at 1900 Arch St., Philadelphia 3, Pa. Officers are: R. H. Taylor, Electroloy Co. Inc., Bridgeport, Conn., president; J. A. O'Grady, Weldaloy Products Co., Van Dyke, Mich., vice president. Marie H. Lawton will serve as secretary-treasurer; T. A. Fernley Jr., advisory secretary.

Malleable Founders' Society, Cleveland, elected these officers: President, Leon J. Wise, Chicago Malleable Castings Co., Chicago; vice president, P. C. DeBruyne, Moline Malleable Iron Co., St. Charles, Ill.; treasurer, Dudley V. Walker, Eberhard Mfg. Co. Division, Eastern Malleable Iron Co., Cleveland; executive vice president and secretary, L. D. Ryan.

Alloy Casting Institute, New York, elected these officers: President, Bradley B. Evans, Empire Steel Castings Inc., Reading, Pa.; vice president, F. M. Fahrenwald, Fahralloy Co., Harvey, Ill.; executive vice president and treasurer, E. A. Schoefer.



VACATIONS

Cleveland Cap Screw Co., Cleveland, will close its plant from July 27 to Aug. 13. During the shutdown, an office force will be on duty.

National Research Corp., Newton Highlands, Mass., goes on vacation July 21 through Aug. 5.

NEW ADDRESSES

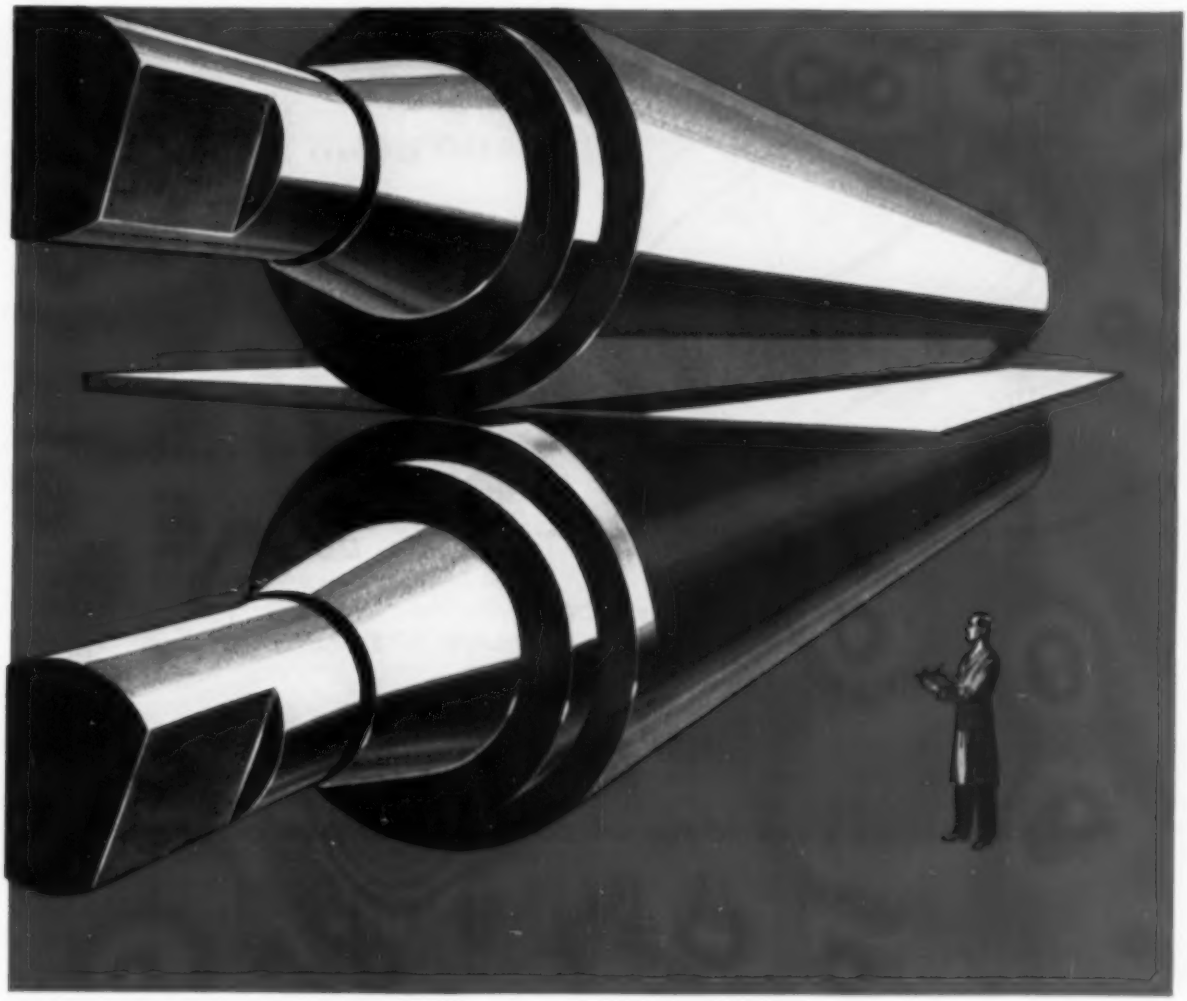
F. B. Stallings of Cleveland acquired the machine tool and pedestal grinder product lines of **Bradford Machine Tool Co.,** Cincinnati. Manufacturing operations are being moved to Lansing, Mich.

Gas Appliance Service Inc., maker of industrial heat processing equipment, moved into larger quarters at 1940 Balmoral Ave., Chicago 40, Ill.

Penn Metal Co. Inc. transferred its general sales office from New York to 40 Central St., Boston, Mass. The office is under the direction of M. K. Brown, general manager of sales. The firm's foreign sales office remains at 205 E. 42nd St., New York, under the direction of J. J. Maier.

Robertshaw-Fulton Controls Co. moved its Cleveland office to 6116 St. Clair Ave.

H. K. Porter Company Inc.'s Henry Disston Division moved its branch office and warehouse to 1100 W. Washington Blvd., Chicago 7, Ill. V. J. Miller is in charge of the Chicago operations.



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Here's a man with experience, where experience counts, on-the-job experience in heavy industrial lubrication.

He's a man who is typical of Atlantic service. Selected to represent Atlantic because he *is* a specialist. And he's backed by other Atlantic specialists in lubrication research, production, quality control and transportation.

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LUBRICANTS · WAXES
PROCESS PRODUCTS

~~400~~ 1000 sfpm

depth of cut-~~.005~~ .125

sfpm-~~800~~ 1250

~~"unmachinable"~~

~~250 sfpm~~ 2000

pieces per hr.-~~20~~ 65

SAE ~~1035-250 sfpm~~ 1175

~~HS-Steel-90 sfpm~~ 505

min. per cut-~~40~~ 4

you can scrap your ideas of cutting-tool performance . . .

STUPALOX

introduces a NEW ERA!

The figures above show the amazing improvements in production obtained through the use of STUPALOX sintered oxide cutting tools in place of tools previously used. Actually the figures are conservative, because tool performance in many cases was limited by inadequate power and rigidity of the machine tool.

Stupalox Tools are available now in commercial quantities, and a variety of styles and sizes of inserts. Write for complete data.

HANDY PACKAGE — *contains ten inserts*

This compact plastic box provides a practical container for ten Stupalox sintered oxide inserts.

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Technical Outlook

ULTRASONIC SOLDERING— With ultrasonics, aluminum is soldered without flux. Any of the common solders work, including those of high lead content. Equipment is available for manual and automatic soldering of electrical, electronic, die-cast, sand cast and formed components. Larger units for continuous fluxless coating of metal strip will soon graduate from the pilot line. Information comes from a report Aeroprojects Inc., West Chester, Pa., gave before the ASTM Solder Symposium.

LOW-NICKEL STAINLESS— Fabricating types 201 and 202 stainless offers no more problems than 301 and 302, G. W. Hinkle, Republic Steel Corp., Massillon, O., told ASTM members at their annual meeting. The low-nickel grades can be formed and drawn on the same dies used with the 300 series. Finishing procedures are the same. Welded joints are equal in shear, tension and impact. Only minor changes are necessary in melting and rolling these alloys (See page 94).

WHISKERS OF IRON— Iron crystals that look like whiskers have tensile strengths of 1,900,000 psi. The maker: General Electric. Although the whiskers are too small to be practical, GE says that large crystals, equally as strong, could be made. Freedom from imperfection is the secret of the superstrength crystals.

STIRRER FOR CASTINGS— Induction stirrers are being installed on two furnaces in General Electric's Schenectady, N. Y., steel foundry. E. R. Oeschger, general manager, Foundry Department, cites these advantages: 1. Almost complete removal of impurities, such as phosphorus and silicates, with minimum loss of metal. 2. Sulphur impurities are reduced to one-third the best levels attainable with conventional practice. 3. Better control of grain size and alloy adjustments. 4. Stratification is minimized. 5. Refining time is reduced.

HIGH-TEMP ELECTRICAL ALLOY— A new copper-zirconium alloy has high electrical conductivity and good strength retention at temperatures above 500°F. Developed at Battelle Memorial Institute, Columbus, O., the material looks good for electric motor commutators.

INVENTORY BRAIN— A typical jet plane has over 33,000 different parts, many of them peculiar to one model. The Navy alone has 75 basic models with 30 different engines. That adds up to 450,000 different items the Aviation Supply Office must keep track of. An IBM 702 electronic data processing machine has been handed the task of inventory control.

ATOMIC SHIELD— Brooks & Perkins Inc., Detroit, announces it has become the first commercial supplier of "Boral"—a neutron shielding material used in atomic installations and atomic power plants. It has a core of boron carbide uniformly dispersed in aluminum and is clad on both sides with commercially pure aluminum. A ¼-in. plate having a 35 per cent concentration of boron carbide has neutron shielding properties equivalent to 26 in. of concrete.

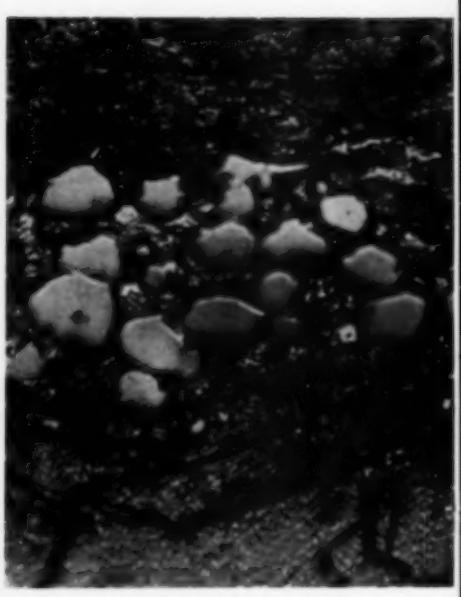


Fig. 1—Carbide segregation in

FAILURES AND CAUSES—PART I

Lubrication in Drawing

By EUGENE D. VIERS
President
Kondor Products Corp.
Cleveland

TWO METAL surfaces sliding upon one another in the absence of lubricants may develop temperatures as high as 1800°F, depending on pressure and speed of motion.

This temperature is caused by friction between the two sliding surfaces. Small metallic particles from one surface are welded to the other surface, and then immediately torn away.

Failures—In draw press work, which is still considered a metal-working art, the greatest obstacle to overcome is pickup (fouling or loading) of the draw ring or pressure pad. This results in scoring, scratching, scarfing, galling or flaking, followed by failure from tearing or breakage.

Breakage is not always caused by progressive die pickup; much of this type failure is due to blank holder pressures, or complete lack of it. Breakage may result from metal lamination or segregation.

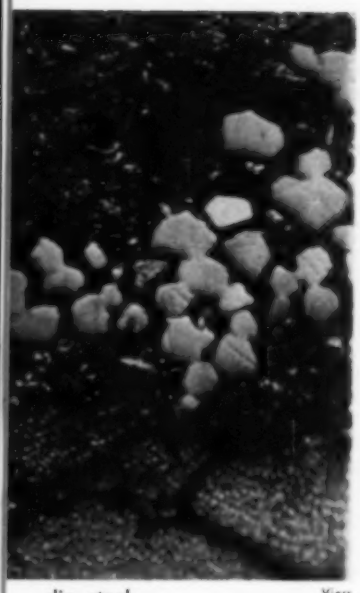
Scoring, Scarfing—Unlike pick-up, scoring and scarfing occurs on the work. Pickup occurs on the die or punch, resulting in scoring the workpiece. Scoring is caused by irregularities of the metal surfaces which come into contact in sliding motion.

Fig. 1 shows the longitudinal surface of a die steel which has excessive carbide segregation. This illustrates a type defect which may cause failure of inferior lubricant, requiring constant honing and stoning of the dies.

Other Causes — These also will cause scoring of the work: Slugs of metal pinched off in blanking and carried into the die to form a "bug" on the punch or draw ring; fragments of dirt from the mixing or applicating pail, which contaminates the lubricant; dirt particles from the operator's hands; even specks of dust, dirt or sand in the atmosphere.

Rust and oxide carried into the die on the work also may cause scoring and scarfing. If not removed, the pickup will progressively become worse, when ordinary or inadequate lubricants are employed, resulting in galling.

Galling—If fouling and pickup are allowed to continue under adverse lubrication, "galling" of the work is inevitable. Large hunks of metal are torn out of the blank



die steel

Fig. 2—Galling of 12 gage (0.107-in.), hot-rolled, pickled steel

and built up on the die or punch, causing deeper gouging on the work.

Fig. 2 shows this type galling. Note the flaking of large particles of metal at the radius, and a large hole torn in the side of the shell. Fig. 3 shows a cross section of the side of the shell where galling occurs.

This condition is invariably limited to heavy gage draw press operations. Failure by tearing and breakage would have occurred on lighter gage steel (due to lower cross-sectional strength) long before the condition could have progressed to this advanced stage.

Wrinkling—In draw press operations, wrinkling of the blank or subsequent reduction is more critical in light gages. Its occurrence decreases as the gage of the metal increases. Cross-sectional strength of the lighter gage is not great enough to withstand excessive blank holder pressures to prevent wrinkling under inadequate lubrication. Fig. 4 illustrates perhaps the most critical draw press example we have observed.

A point was reached where either breakage or wrinkling was inevitable, regardless of pressures or lubricants. As tryouts on this part continued, wrinkling persisted until blank holder pressure caused breakage. When pressure was reduced an almost imperceptible amount, wrinkling recurred. Many kinds and types of oils, greases and compounds were tried with much the same results. This part was not drawn successfully until a lubricant with sufficient load bearing characteristics was used.

Breakage—When excessive wrinkling occurs, due to lack of blank holder pressure, the resulting wrinkles crowd or jam over the draw radius. This increased stress concentration at the draw ring, with its increased unit pressures, results in seizure and breakage of the part.

When drawing an irregularly shaped part, as shown in Fig. 5, breakage results when excessive blank holder pressure is applied to prevent the flow of metal.

Structural defects in sheet steel also cause breakage. Lamination and segregation of the steel are the most prevalent causes. Fig. 6 shows a part which failed by tearing or breaking due to laminated steel. More important than the loss of this part by failure is its effect on the radius of the die; scarfing resulted from the build-up on this surface.

Fouling — The above types of failures are the direct result of metal to metal contact and are called fouling.

Fouling cannot take place when a film of lubricant separates workpieces and tools (dies, punches, blank holder, draw beads, etc.). Fouling of this type is due to: 1. Inadequate film strength. 2. Insufficient lubricant. 3. A lack of lubricant.

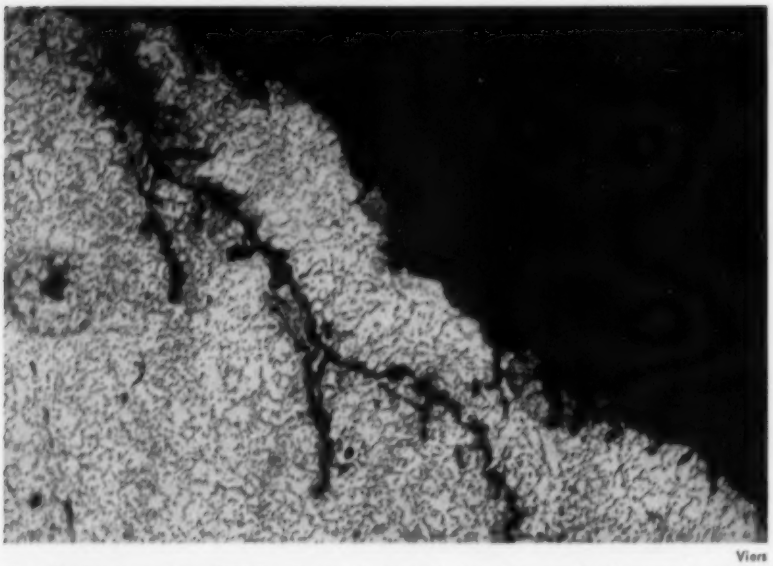
Film Strength—Inadequate film strength may result from a combination of conditions: 1. Pressure or gage of metal. 2. Sliding speed or speed of press. 3. Choice of lubricant, depending on temperatures attained under these variable conditions.

A lubricant that has a film strength which is satisfactory under one set of conditons would be entirely unsuited if the conditions were altered.

General Rules—Considering the tools, the better the finish, the lower the requirements for film strength. The harder the tools, the lower the requirements for film strength.

The heavier the gage, the higher the alloy drawn, the rougher the work and the softer the dies; the higher the film strength required to form a piece or given part. And the faster the press and the greater the temperature, the greater is the demand for high film strength.

Temperature—The load bearing characteristics of a lubricant film may be satisfactory at a certain operating temperature but completely break down under increased temperatures. This may be the result of excessive press speeds



Vien

Fig. 3—Cross section (X200) of part in Fig. 2 showing result of severely working the surface

Geometric Stamping Co.

Fig. 4—A 63 per cent reduction, 11 in. in diameter by 7 in. deep, drawn from 23 gage (0.028-in.), cold-rolled steel

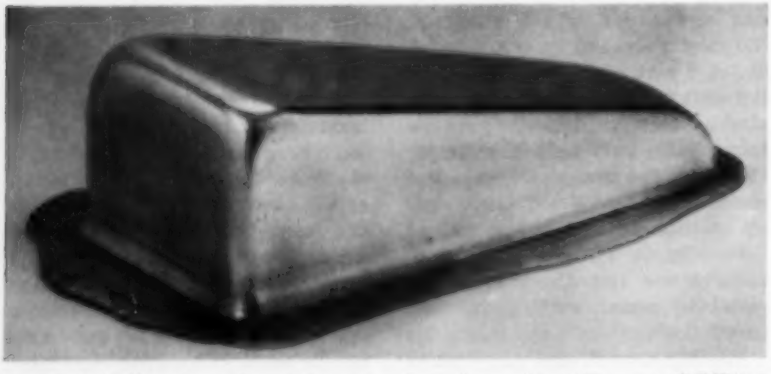


Fig. 5—A half section of part for steam iron drawn from 18 gage (0.050-in.) brass strip

when drawing heavier gage or inferior quality metal, even a different specification of alloys.

Example: Due to the shortage of certain elements or increased costs, it is sometimes necessary to introduce substitute alloys, such as type 430 for 302 stainless. In forming 430, it is more practical to use a better lubricant than to introduce an additional drawing operation due to the difficulty in forming the substitute alloy.

Mineral Oil—Fig. 7 illustrates inadequate film strength or load bearing ability of a mineral oil applied to the strip stock before blanking and drawing. This type fouling of the draw ring comes with the first part drawn. Friction causes an immediate rise in surface temperature. Note the wrinkling of the flange. This would be surface irregularity.

As production continues, the scarfing gets deeper and temperatures continue to rise. Wrinkling becomes more pronounced. After a few hundred pieces are drawn, it is necessary to shut down the press, polish the dies by stoning or honing, then continue the same inefficient cycle of operation.

Solution—Fig. 8 shows the results after applying a lubricant which prevented metal to metal contact, eliminating fouling—and the wrinkling shown in Fig. 7.

It may be possible that the wrinkling shown caused the fouling, and once a cushion of lubricant with adequate film strength was introduced, the wrinkling was eliminated.

Insufficient—By insufficient lubricant, we mean: The extension of a satisfactory lubricant by excessive water dilution, the addition of mineral oil or other additive or solvent, or the intermittent application of lubricant to every sixth or tenth piece.

Another example: Multiple stage (from one press to another) or progressive drawing on multistage dies on a single press. After a lubricant which will form the first blank and cup with some degree of success has been selected, the part often may be carried through several stages of reduction, depending on the initial application of lubricant.

One such example is shown in

Fig. 9. The workpiece was blanked and cupped from coil stock in the first operation, then given four redraws in continuous sequence.

Breakage — Dies fouled rather consistently, and in certain coils of stock, breakage occurred during the third or fourth draw. Investigation of these particular coils disclosed a much lower yield point and a correspondingly lower ultimate strength. This stock was promptly rejected.

Unquestionably, increased friction, resulting from fouling of the dies, was responsible for the breakage of the material with the lower physical characteristics.

Salvaged — When a lubricant with higher load bearing and additional adhesive properties was introduced, the rejected stock was drawn without fouling, scoring or breakage.

The thinnest possible film of concentrated lubricant is more satisfactory and more economical than a heavy coating applied by dipping the work into the diluted material.

Lack of Lubricant—In some instances, it has been reasoned that if a little compound is helpful, a lot is better. With this in mind, a heavy coating is applied to either the die or workpiece and several pieces allowed to pass over the die without any lubricant.

In automotive body production, it is customary to spot the lubricant at strategic areas on the developed blank, die, punch or draw ring.

We have observed one set of operators run the entire shift with an allowable percentage of rejections, and the next shift unable to produce one satisfactory panel.

An Art—Knowledge of applying lubricants is jealously guarded and not passed on from one shift to another. In this respect, metal drawing is an art, and steps are under way to eliminate, where possible, the manual methods of lubricant application.

Part II of this article, to appear July 16, will cover materials used in drawing lubricants and methods of application.

• *An extra copy of this article and the other two in this series are available until supply is exhausted. Write Editorial Service* STEEL, *Penton Bldg., Cleveland 13, O.*

Fig. 6—Breakage caused by laminated steel

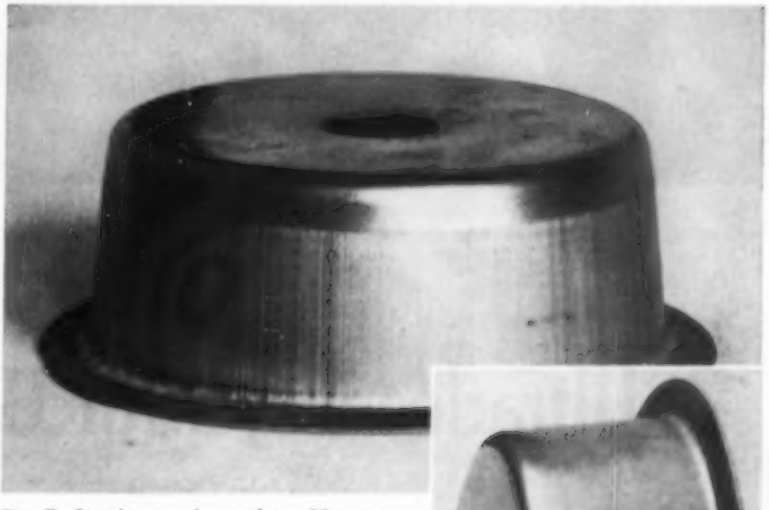


Fig. 7—Simple cup drawn from 20 gage (0.036-in.), cold-rolled strip steel

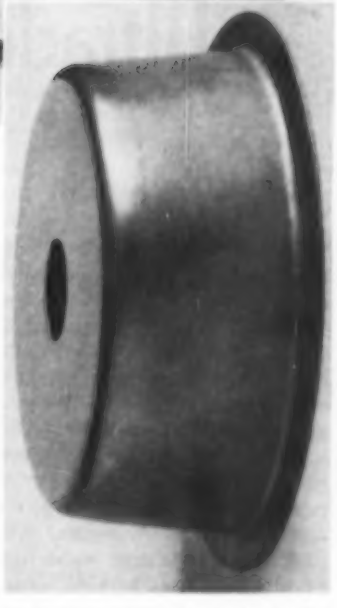
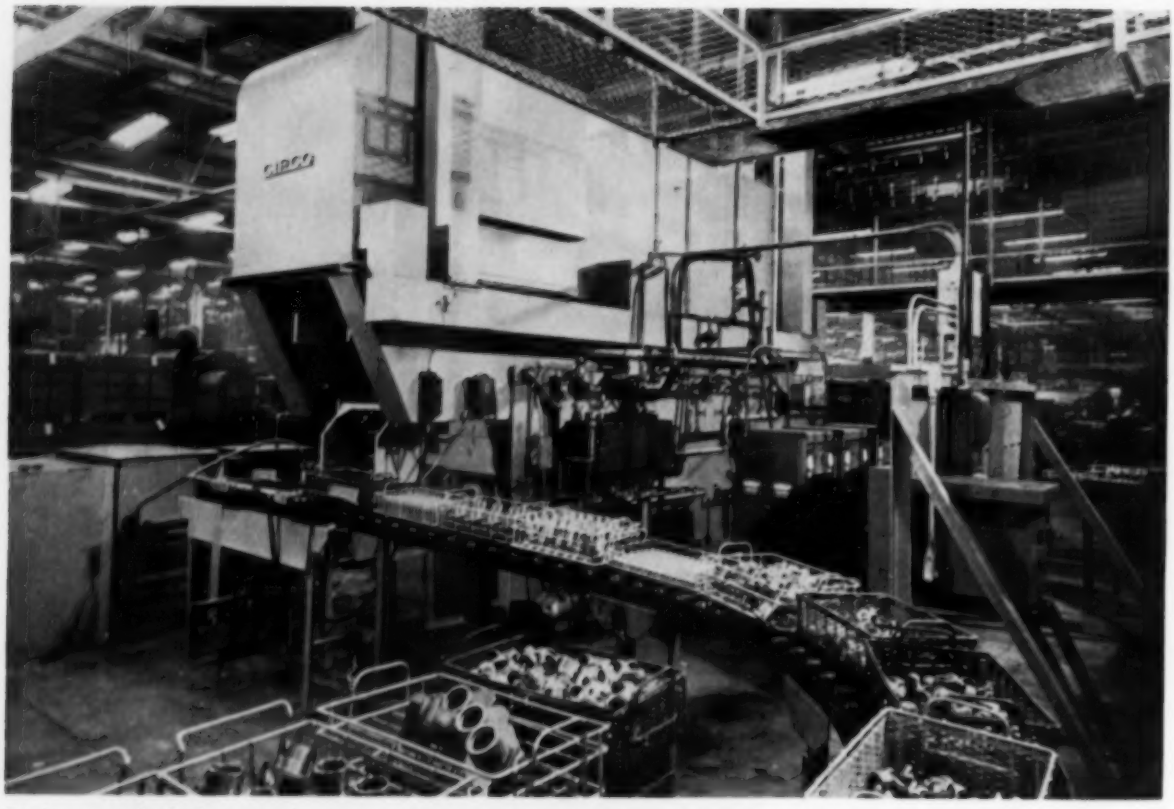


Fig. 8—Same cup shown in Fig. 7 after drawing several hundred pieces without touching the dies. The correct lubricant was used

Fig. 9—Unusual part drawn from 22 gage (0.030-in.), cold-rolled coil steel



Discharge end of ultrasonic degreaser at Saginaw Steering Gear. Automatic unloading device for wire baskets deposits parts on gravity roller conveyor

Ultracleaning with Ultrasonics

STEERING GEAR parts emerge microscopically clean at flow-line speeds from the automated cleaning line at Saginaw Steering Gear Division of General Motors Corp. An ultrasonic cleaning stage climaxes conventional solvent dip and spray treatments.

In the manufacture of steering gear assemblies, grease, oil, compounds, chips and entrapped dirt accumulate on machined parts. "Adequate cleaning" which leaves as much as one particle of abrasive residue on steering gear internals is likely to cause immediate or eventual damage to the operating unit.

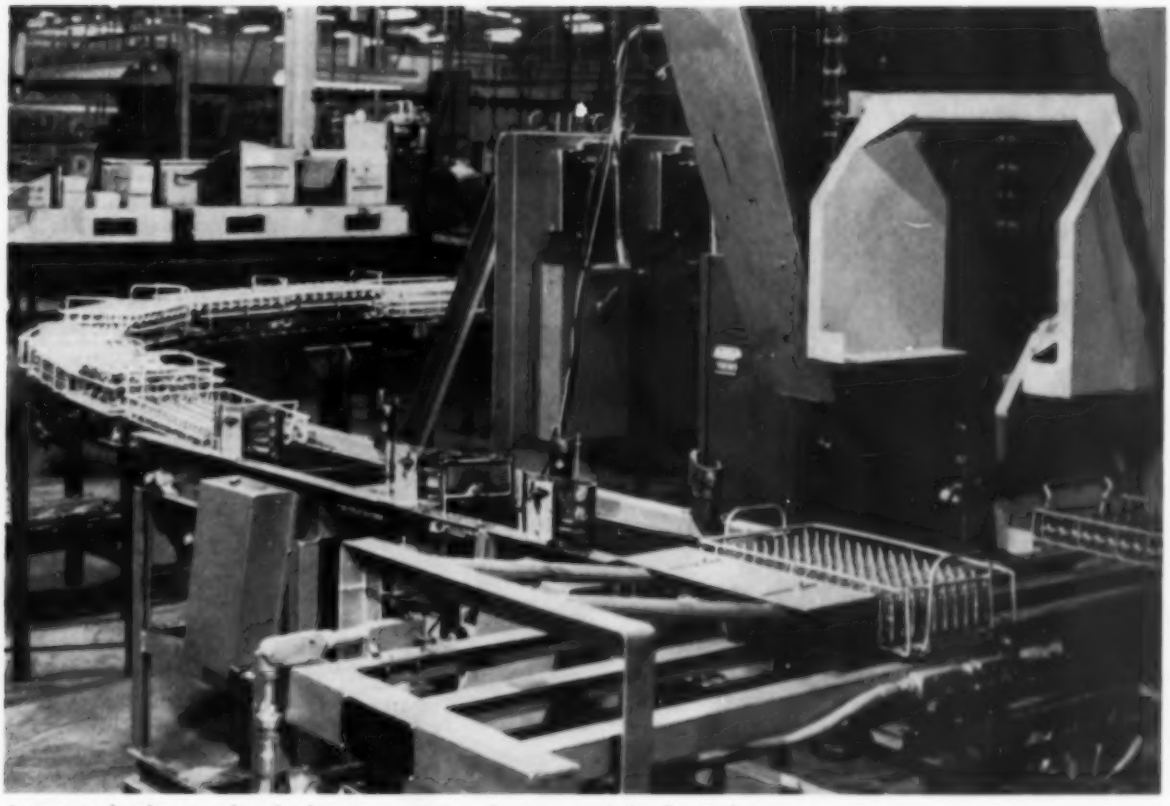
High Reject Rate—Saginaw had a high percentage of rejects which were attributed to dirt carry-over. Production schedules were disrupted, either through the high rejection factor or through a slowdown in the cleaning process as more time was given to solvent exposure.

The problem was solved when the company installed the automated, high-speed cleaning line with an integral ultrasonic chamber. Circo Equipment Co., Clark (Rahway), N. J., designed the equipment.

Equipment — The cleaning machine loads, transports, cleans and then unloads wire baskets stacked with steering gear parts. Its 50-ton capacity is more than enough to handle the output of the machining lines.

Any reasonable acceleration of the line will not reduce cleaning thoroughness. Ultrasonic cleaning effectiveness is not intimately related to exposure time, but to the electrical energies involved.

Operation — At Saginaw, machined parts come from the production area, are routed to inspection stations, then move by gravity and mechanical conveyors to a loading table at the entrance of the crossrod cleaning machine.



Automatic loader transfers baskets to a series of conveyor belts for pickup by downward moving arms. One basket is loaded every 15 seconds

Baskets are picked up by moving hangers. A regular flow is maintained, the speed determined by the rate at which the power-driven, hanger-conveyor moves. Locking mechanisms and safety stops along the line prevent blockage or pile ups.

Solvent Dip—A pneumatic loading shuttle, actuated by a limit switch, feeds baskets into the cleaning chamber. The first of three cleaning stages to which parts are subjected is hot trichlorethylene vapor. Passing through the vapor chamber, baskets dip into a sump containing boiling solvent (188°F) which vigorously scrubs off heavy, accessible dirt deposits.

The baskets move through the boiling sump for 30 seconds and lift into a section where cooler, distilled trichlor is pressure-sprayed against the parts to force out remaining residue. Six-hundred gallons of solvent a minute, flushing through the spray chamber, are supplied from the vapor level condensing coils and the auxiliary solvent recovery still.

Ultrasonic Stage—At this point, parts can be called "clean," but to achieve the necessary microscopic cleanliness, they are put through an ultrasonic chamber.

The ultrasonic scrubbing chamber is fitted with a system of 2 x 3-in. transducers. These devices contract and expand rapidly when an alternating current, produced by a radio-frequency generator, passes through them. The transducers contain a polycrystalline ceramic, barium titanate.

Ultrasonic Cleaning — In Saginaw's unit, baskets of parts go through a 140°F-trichlorethylene bath subjected to 40,000 vibrations a second by three sets of ten transducers.

When baskets dip into the bath, they cause interference in the standing waves, and set up violent turbulence. The scrubbing action tears loose particles of dirt from blind holes, crevices, inaccessible spots and invisible pores. Cleaning time rarely exceeds 1½ to 4 seconds; extended immersion is not needed.

Quick Trip — The trip through the ultrasonic area takes 20 seconds. From this stage, baskets are carried through another clean solvent spray section, into an atmosphere of hot solvent vapor and onto a discharge conveyor system. As hot parts are lifted into the cooler air, condensed solvent remaining quickly evaporates, leaving parts clean and dry.

Baskets exit in reverse sequence to the automatic feed action, sliding onto a power conveyor protected with limit switches to prevent pile ups.

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(Numbers refer to the table below)

Now, Tool Steel Extrusions

WOULD YOU pick tool steel as a likely candidate for extrusion? Allegheny Ludlum Steel Corp. did.

The firm has been squeezing tool steels through dies at Watervliet, N. Y., since 1952. The demand is growing; users come back for more. Here's why:

- Extrusion can produce shapes too intricate to roll.
- User does not pay for excess weight.
- Scrap is reduced.
- Decarburization is prevented.
- Machining time and costs are cut.
- Small quantities of shapes are economical.

Glass Lube—Allegheny Ludlum extrudes tool steels by the Ugine-Sejournet process—molten glass is used as a lubricant between billet and die. The glass also protects the hot steel from oxidation and decarburization. To get a scale free and decarburization free surface in the first place, billets are heated in a barium chloride salt bath.

Compared with the cost of a set of rolls, die costs are peanuts. That gives extrusion a distinct advantage on short runs. (Hot rolling is cheaper if production is great enough to amortize the cost of the rolls.) Extrusion also wins on setup time: It's easier to change dies than to change rolls.

Shapes — You wouldn't try to roll most of the shapes in the photograph—they are naturals for extrusion. But extrusion has limitations, too. For carbon and low alloy tool steels, the minimum cross-sectional area that can be extruded is 0.5 sq in. Increasing alloy content raises this minimum.

Shape also has an effect, so that it is hard to set general criteria. Maximum size that Allegheny Ludlum can produce is contained in a 5.25-in. circle. See the table below for some typical tool steel extrusions.

Tolerances are about the same as for hot rolling: 1/32-in. minimum to ⅛-in. maximum on corners; ⅛ to 7/16-in. on fillets. Although mechanical properties of extruded tool steel have not been investigated, evidence from stainless steel and titanium indicates that longitudinal properties will be at least equal to hot-rolled bar stock and transverse properties should be superior.

Savings with Tool Steel Extrusions

Shape in Photo	Type	Name	Analysis	Rolled Area* (sq in.)	Extruded Area (sq in.)	Weight Saving (per cent)	Use
1	Cold work	Ontario	C 1.5, Cr 12, Mo 1, V 1	3.2	2.44	24	Knife
2	Graphitic oil hardening	Oilgraph	C 1.3, Cr 0.25, Mn 1, Si 1.4, Mo 0.25	2.92	1.92	34	Guide
3	Water hardening	Pompton	C 1, Cr 0.2	5.40	4.80	11	Guide
4	same	same	same	2.42	1.52	37	Grip
5	same	same	same	2.04	1.70	17	Bumper
6	High speed	DBL-2	C 0.80, Cr 4, W 6, Mo 5, V 1.5	7.06	4.49	36	Drill
7	same	same	same	9.62	3.28	66	Cutter

* Figured on the minimum applicable rolled shape

J&L SHEET STEEL ON ANOTHER *Important* JOB

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Because durability is one of the requirements for the basic material of these modern, attractive partitions, J&L high-quality sheet steel enjoys a growing acceptance among manufacturers of movable interior partitions.

J&L success in meeting their demands is the result of rigid quality control during production, coupled with a thorough understanding of product end use.

If you fabricate sheet steel, this formula for successful service can be applied to your requirements. Whatever your specifications for uniformity in workability, formability and drawing properties, you can depend on J&L sheet steel. It will help you get the best out of your production equipment and add to the value of your finished product.

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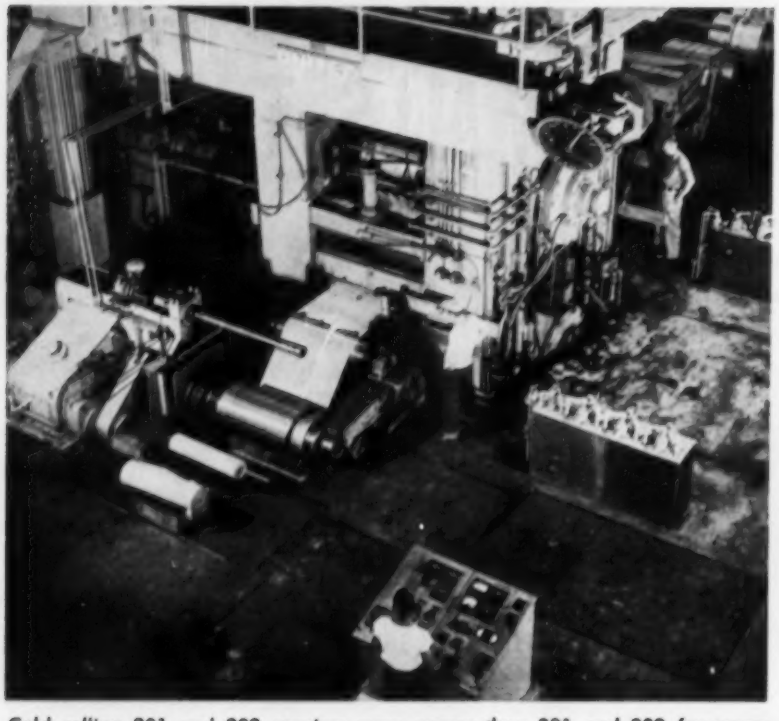

Cold rolling 201 and 202 requires more passes than 301 and 302 for equal gage reduction

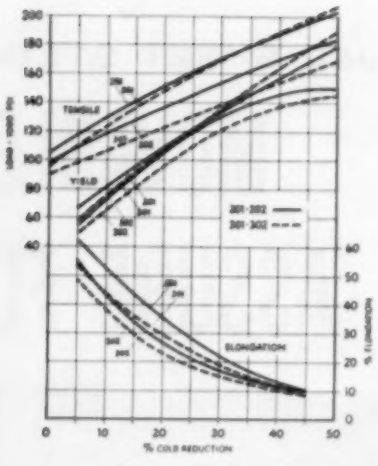

Fig. 1—Effect of cold rolling

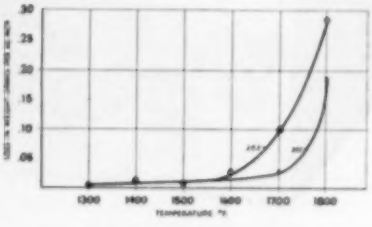

Fig. 2—Oxidation characteristics

Making 200-Type Stainless

Production characteristics of the new low-nickel stainless grades were revealed at the annual meeting of the American Society for Testing Materials

By G. W. HINKLE
Republic Steel Corp.
Massillon, O.

PRODUCTION of the new AISI Types 201 and 202 stainless steels offers no special problems for alloy steel producers.

Melting procedure must be changed slightly to meet the required chemistry. Rolling ingot into sheet and strip takes longer (compared with 301 and 302); more power is needed.

Chemistry — Types 201 and 202 have higher manganese and nitrogen contents than their 300 series counterparts, and less nickel. Table I shows the melting ranges of the new alloys.

At Republic, we use a normal scrap charge, with oxygen blow for carbon oxidation, followed by lime and silicon reduction for chromium recovery. Nitrogen is controlled by additions of high nitrogen chrome pellets. Two additions of electrolytic manganese are made at the end of the heat to effect best recovery.

Reladling is employed; we have found magnesite nozzles best for pouring. Tapping temperature is controlled at 2740 to 2750°F.

Blooming—The high manganese and nitrogen contents of the alloys impart considerable stiffness at rolling temperature. Heating in soaking pits requires more care. Best practice is to charge warm, control the heating rate to 50°F an hour, soak out well at 1800°F

Table I—Melting Ranges

Type 201	Type 202
C 0.15 max	0.15 max
Mn 5.5-7.5	7.5-10.0
P 0.06 max	0.06 max
S 0.030	0.030
Si 1.00	1.00
Cr 16.0-18.0	17.0-19.0
Ni 3.5-5.5	4.0-6.0
N 0.25 max	0.25

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THE JOB	THE BRUSH
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211

THE UNITED STATES GRAPHITE COMPANY

DIVISION OF THE WICKES CORPORATION • SAGINAW, MICHIGAN

Table II—Effect of Lower Annealing Temperature

TYPE 202					TYPE 201				
Temp °F	Yield psi	Tensile psi	Elong. % in 2"	Rock. T-30	Temp °F	Yield psi	Tensile psi	Elong. % in 2"	Rock. T-30
1800	48,500	105,300	57	68.5	1800	52,760	110,000	58	71
1800	49,650	103,200	56	68.5	1800	52,420	113,000	59	72
1850	44,180	102,500	59	67.5	1850	51,000	107,600	59	70.5
1850	44,780	101,600	59	67.0	1850	50,940	106,700	59	70.5
1950	42,630	99,450	62	67.0	1950	45,120	103,700	62	69.0
1950	42,190	99,610	65	66.5	1950	47,190	102,400	62.5	68.0

and roll at 2250 to 2270°F. The higher temperature is used on large ingots. There is an over-all increase in soaking pit time of 20 per cent, compared with 301 and 302.

There has been no difficulty in rolling small slab ingots up to 16 x 32 in. (9000 lb) on either 201 or 202. However, power needs are greater and reductions somewhat lighter.

Slab, Strip—Hot rolling offers no problems. In cold rolling to gage for annealed No. 1 or 2 finish, types 201 and 202 require 15 to 20 per cent more passes for equal gage reductions. Hardness builds up more rapidly than in 301 and 302.

There is little difficulty in developing high tensile requirements on 201; it requires about 10 per cent less reduction to meet half hard requirements.

Annealing—Changes are necessary in annealing and pickling procedure. Annealing temperature must be lowered because these steels scale more readily than 301 and 302 at temperatures above 1600°F. Best results are obtained around 1800°F (see Table II).

Acid pickling baths must operate at lower temperatures and concentrations (10 to 20 per cent). This is especially important when producing strip which requires polishing on the finished part, such as cooking utensils or automotive parts. Caustic pickling, either hydride or virgo, has proved satisfactory.

Corrosion Properties of 200 Series

W. G. Renshaw and R. A. Lula of Allegheny Ludlum Steel Corp.'s research laboratory, Brackenridge, Pa., gave results of corrosion studies on chromium-nickel-manganese steels at the annual ASTM meeting. These composition ranges were investigated: Chromium, 15 to 21 per cent; nickel, 2 to 6.50 per cent; manganese, 5 to 17 per cent.

Chromium content is significant in general corrosion resistance. This is shown by an improvement of nitric acid resistance as chromium is increased to 20 per cent.

Nickel provides an additional improvement in general corrosion resistance, and is especially effective in promoting resistance to localized attack.

Manganese can be varied from 4 to 14 per cent with no significant effect on corrosion resistance.

Types 201 and 202 are equal to 301 and 302 in many mild environments, like acetic, citric and phosphoric acids. For more severe conditions, a 20 per cent chromium, 6 per cent nickel, 8 per cent manganese alloy has been developed which is comparable to type 304.

The intergranular corrosion resistance of the chromium-nickel-manganese steels is the same as that of the chromium-nickel steels. Lowering the carbon content prevents intergranular corrosion, but only in short sensitizing times, similar to type 304L. Carbon content seems to be less critical than in the chromium-nickel grades; the maximum carbon content corresponding to the 0.03 per cent in chromium-nickel steels is between 0.05 and 0.06 per cent.

The new alloys are subject to stress corrosion cracking like the chromium-nickel grades. The amount of chromium, nickel or manganese appears to have no effect on resistance to stress corrosion, provided the structure is austenitic. The presence of delta ferrite can prevent or decrease susceptibility to such failure.

STEEL has previously emphasized (Apr. 30, p. 93) that corrosion properties of the 200 series stainless steels are excellent under normal atmospheric conditions. "No significant differences have been found in 24 years of testing by Electro Metallurgical Co. and in 14 years of testing by International Nickel Co. Specimens were exposed to industrial and marine atmospheres."

It has been estimated that 201 and 202 can do a satisfactory job in perhaps 85 per cent of the applications where 300 series steels have been used.

Standard Steel forged flanges cut manufacturing costs for Elliott Company

For the heavy bolting ring flanges on their synchronous condenser shells, Elliott Company has turned to Standard Steel forged flanges. They get a better product at lower cost because:

- Flanges are forged very close to final tolerances, so expensive machining time is greatly reduced.
- Uniform grain structure permits faster drilling of bolt holes—40 in each flange.
- The high strength of Standard Steel forged flanges provides an ample safety factor to withstand any accidental explosion pressures.

Next time *you* need rings, flanges, gear blanks, shafts, wheels, or special shapes —and need them fast—get our quotation first. For bulletin 10,000, write Dept. 8846, Standard Steel Works Division, BLH Corporation, Burnham, Penna.

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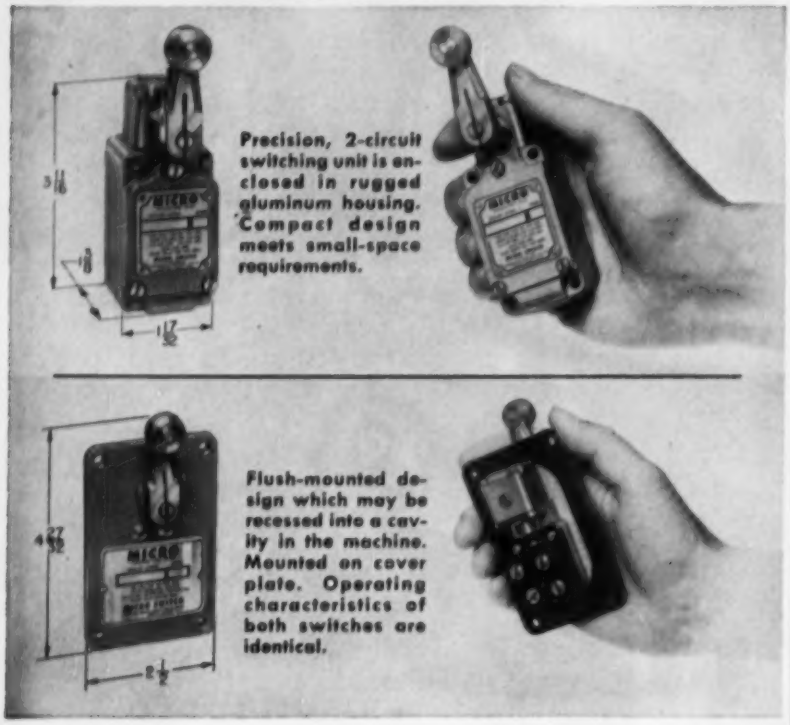
MICRO *precision switches*

...THEIR USE IS A PRINCIPLE OF GOOD DESIGN



Precision, 2-circuit switching unit is enclosed in rugged aluminum housing. Compact design meets small-space requirements.

Flush-mounted design which may be recessed into a cavity in the machine. Mounted on cover plate. Operating characteristics of both switches are identical.

Here is a small, 2-circuit limit switch to meet a wide variety of machine tool applications

This MICRO precision switch is designed to meet every requirement for a compact 2-circuit switch for use as a limit, safety or interlock switch on complex production equipment.

It has small size, extreme versatility, precision, reliability and ruggedness. All moving parts and the switching chamber are completely sealed, protected from wear or becoming fouled. Versatile field adjustability permits its use in practically any type of application or location.

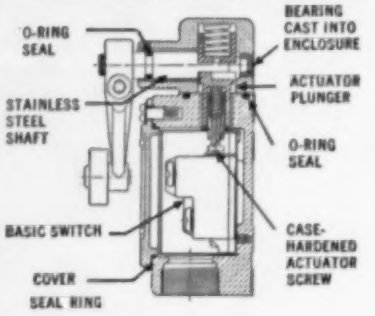
Two-circuit contact arrangement allows flexibility in circuit design. Reliability of the precision, snap-action unit assures accurate repeat operations throughout many millions of hard, fast actuations. Although small and compact in size, this switch is not only a precision instrument. It is designed and built to stand the most severe abuse.

The electrical rating is: 10 amperes 120, 240 or 480 volts a-c; ½ H.P. 115 volts a-c; 1 H.P. 230 volts a-c; .2 ampere 115 volts d-c; .1 ampere 230 volts d-c; .04 ampere 550 volts d-c. Pilot duty rating is: 600 volts a-c, max.

Like many other precision switches in the MICRO SWITCH line, this versatile 2-circuit switch is also an ideal component for installation on present plant equipment. MICRO precision switches make production machinery safer, more automatic and more productive.

As shown above, this switch is also available in a flush-mounted design which may be recessed into a cavity in the machine. The operating characteristics of both switches are identical.

Seals Provide Maximum Protection



Sealing is provided by use of O-ring seals on the actuator shaft and between the actuator head and the housing. A synthetic rubber ring seal is provided for the cover. These seals provide maximum protection against entrance of dust, oil and other liquids. The switch meets NEMA specifications for an oil-tight pilot device.

Adjustable Head Assembly

The switch is easily mounted in almost any location. The user can remove the head and locate it in any of 4 positions (as illustrated). The actuator arm is field adjustable to any position through 360° and can be adjusted to operate in either direction or in both directions.

Contact Arrangement

Contact arrangement of the basic switching unit is double-throw, two-circuit, single-pole, double-break. A single-pole, double-throw circuit can be obtained by tying together one normally-open and one normally-closed terminal and using this connection as the common terminal.

MICRO precision switches are sold by distributors in key cities everywhere. For engineering assistance, call the MICRO SWITCH branch nearest you.

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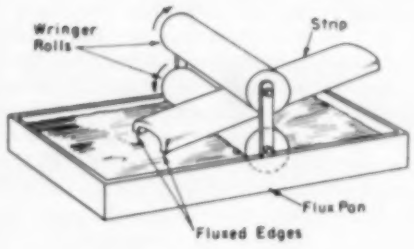

Fig. 1—Applying flux to one side of strip

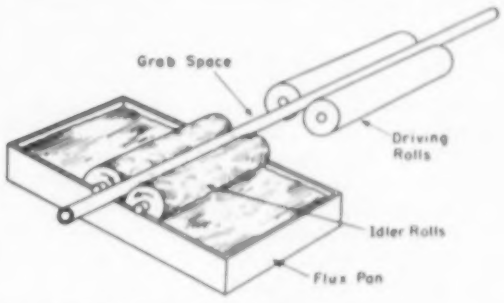

Fig. 2—Fluxing outside of strip or rod

Fluxing Techniques

By A. M. SETAPEN
Manager, Engineering Division
and
E. S. CHAMER
Metallurgist
Handy & Harman
New York

THERE ARE almost as many methods of applying flux as there are brazing operations.

Each plant seems to develop one or more fluxing techniques best suited to the shape and size of the pieces being brazed. Many have devised setups for fluxing on a production basis.

Dipping—The paint brush is probably the most familiar method of applying flux. But on production jobs, brushing may prove too slow. In some cases, fluxing can be speeded up by dipping the part into the flux pot. Dipping is particularly helpful when the end of the piece must be fluxed.

When the shape or size of the part does not permit dipping, some of the following methods, or adaptions of them, may be helpful. When a row of parts must be fluxed simultaneously, the fastest method is to bring the flux to the parts in some type of dispenser. Devices include an oil can for thin flux and a cream or syrup dispenser for the thicker flux.

Flat Strip—One plant developed an ingenious arrangement for fluxing flat strip. The strip is run through a set of rubber covered, washing machine wringer rolls as the flux is played out onto the upper roll.

Easily adapted for continuous operation, this setup can apply a uniform coating of flux of any thickness. The quantity left on the strip is controlled by adjusting the spacing between the wringer rolls. The smaller the clearance, the thinner the coat. This same setup can be used to remove excess flux from flat strip after dipping.

One Side—Fig. 1 illustrates a variation of the idea. It is used to flux one side of a flat strip, or raised portions of a strip, such as the mating edges of a hollow knife handle.

The lower wringer roll, immersed in a pan of flux, continuously transfers the flux to the bottom of the strip as the rolls are rotated. The upper roll holds the piece against the fluxing roller; its pressure is adjusted to leave a film of required thickness. To prevent the upper roll from picking up flux, and fluxing both sides of the piece, the strip should be at least ¼-in. thick.

Tubing, Rod—Where the shape of the part permits, flux may be applied by placing the part on a pair of parallel rotating rolls, as on a centerless grinder. The excess flux will drain off as the part rides on the rotating rolls.

This technique is convenient for fluxing the outside surface and one end of a tube or rod (see Fig. 2). The end of the tube to be fluxed is placed on a set of idler rolls in the flux pan, with the tube opening protruding beyond the edge of the pan to keep the flux from entering the interior of the tube.

The other end of the tube is laid in a set of driver rolls outside the pan. Rotation of the rollers applies the flux evenly to the circumference of the piece. It's best to leave 5 or 6 in. of "grab space" between the edge of the pans and the driver rolls, so the operator can pick up the tube from the rolls quickly and conveniently.

Jigs — Combinations of appli-

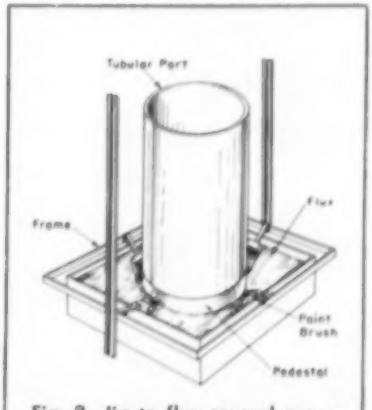

Fig. 3—Jig to flux several areas simultaneously

cator wheels, paint rollers and paint brushes can be assembled on frames and jigs for fluxing several sides of the same piece simultaneously.

One plant, which was brazing longitudinal fins on a large-diameter tubular part, rigged up paint brushes on the sides of a square frame mounted on a vertical rail. As the frame was moved up around the piece, the required areas of the tube were fluxed in one pass, leaving the other areas flux-free (see Fig. 3).

Alloy Fluxed — Another manufacturer has devised a simple method to flux flat strip that is formed and brazed continuously to make tubing. Brazing alloy is passed through the jar of flux before feeding it to the joint.

The alloy enters at the top of the jar and exits through a small gasketed hole drilled in the bottom of it. The amount of flux used is regulated by a tapered wooden peg inserted in the hole. The peg also prevents possible abrasion of the alloy as it passes through the hole (see Fig. 4).

Larger Parts—Fig. 5 illustrates a convenient method for fluxing pieces too large to be held comfortably in the hand. Such pieces, if fluxed by hand, usually require some awkward hand and wrist motions that are fatiguing for the operator and limit his productivity.

With the arrangement shown, the operator places the part on a rotating spindle, clamp or other retaining device, and applies flux simply by holding the flux brush against the rotating piece. Spindle speed should be regulated to assure adequate fluxing and to keep the flux from spattering.

Handling Flux—For uniform results and ease of application, flux paste should be stirred frequently to maintain uniform consistency. Water should be added once or twice a day to make up evaporation losses, particularly if the flux pot is left uncovered.

For best results, flux paste should be maintained about 180°F in a heated flux pot. Preheated flux can be spread more easily and uniformly, with less waste, and will adhere more firmly to the metal. Preheated flux is recommended for better adhesion on polished surfaces.

Flux should be stored in a covered jar at room temperature.

Cleanup—Good fluxing and brazing practice not only affects the quality of the brazed joint but also determines how easily the flux can be removed. If too little is used, or if it is heated too much or too long, the flux becomes spent, or loaded with oxide. Spent flux is hard, glasslike and difficult to dissolve. It may be necessary to use wire wheels, wire brushes, grinding wheels or blast cleaning to clean off the piece.

If too much time is being spent in flux removal, it would be well to make certain that the operators are using enough flux and are not overheating the work.

Better—Flux can be removed more quickly and easily immediately after the joint is brazed, while the flux is still warm. Wiping the brazed joint with a wet rag or quenching the piece from black heat (after the alloy has completely solidified) will crack or scale off most of the adhering flux.

If the piece has been standing for 5 or 10 minutes, the flux will dissolve in hot water. The hotter the water and the more agitation used, the more rapid and complete will be the removal.

Harder—If the flux is allowed to cool completely, boiling water and vigorous agitation may be necessary. Warm flux is soluble; adding caustic or acidic cleaners to the bath offers no appreciable advantage.

To clean flux from the inside of a joint, it may be necessary to use steam, followed by a 5 to 10 minute rinse in hot water.

When flux has been saturated with oxide, it is less soluble in water and more difficult to remove—a good reason for using an adequate concentration of flux. Stubborn pockets can be removed in a warm pickling bath of 10 per cent sulphuric acid. Nitric acid should not be used as the pickling agent because it will attack the brazing alloy.

Flux Safety — All general purpose fluxes used in low temperature brazing contain fluoride salts. The usual precautions for handling acidic materials should be observed, since prolonged contact with skin or continued breathing of fumes can cause dermatitis and respiratory irritation.

Fluoride poisoning is not cumulative like lead poisoning. The human body can excrete the quantities of fluorides that may be ingested by occasional contact with flux fumes.

Ventilation—Flux safety is part of the larger program of industrial hygiene. Usually, the fumes from most low temperature brazing alloys, which contain zinc and/or cadmium, and the combustion gases from a torch or brazing furnace should be vented.

If proper ventilation is provided for the brazing operation, no special precautions need be taken for the flux — except normal good sense in handling.

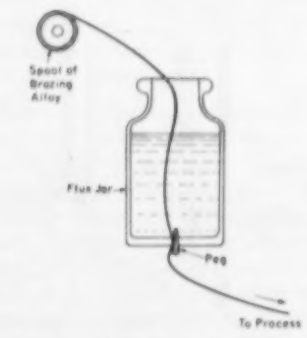

Fig. 4—Applying flux to the brazing alloy

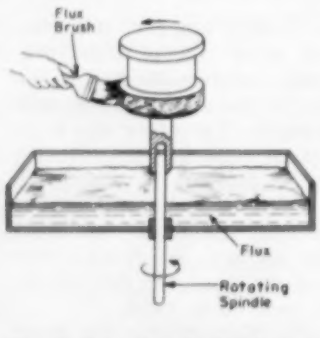

Fig. 5—Setup for fluxing larger parts

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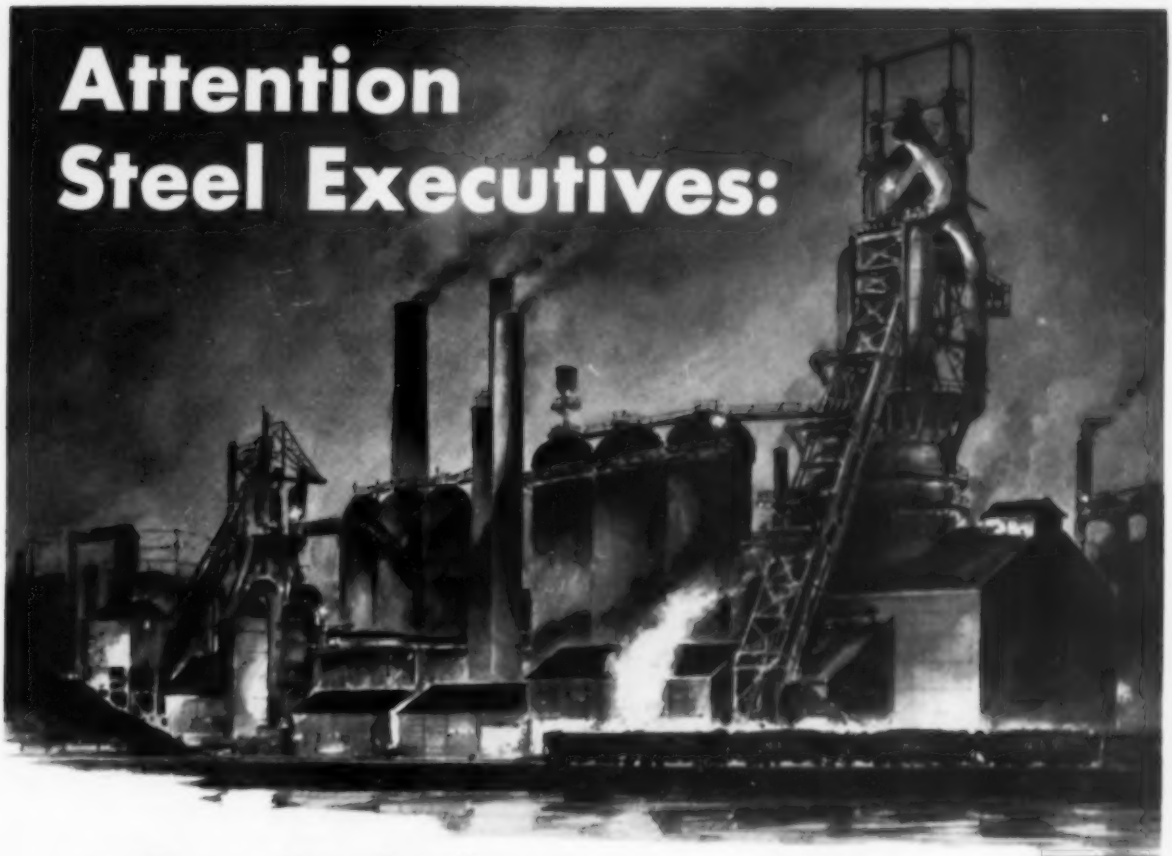
Attention Steel Executives:



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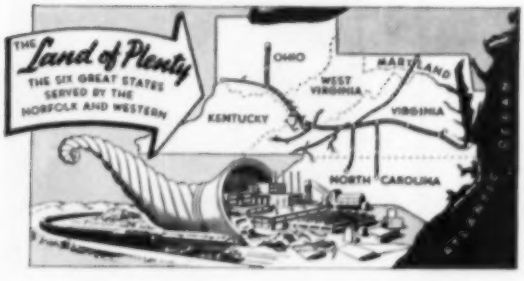

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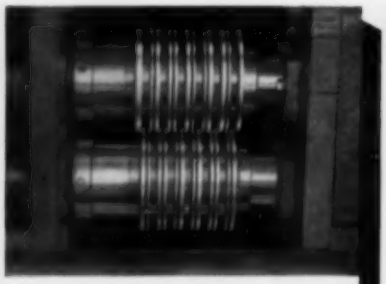

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June 25, 1956

One stud is welded every 5 seconds on semiautomatic positioning machine

Studs Shell Corn

COST CUTTING ideas can't come fast enough in the farm machinery industry. Most of them don't cut so deeply as a Nelson stud welding installation at the C. O. Bartlett & Snow Co., Cleveland.

Bartlett & Snow makes corn shellers. The heart of the machine is a steel cylinder which bristles with heavy teeth. These were square rivets, set in holes in the cylinder and upset. Welded studs replaced them.

Count Blessings—It turned out that 44 hardened studs (Rockwell 12-15) do as much corn shelling as 160 rivets, but benefits didn't stop there. Here's what else the installation achieved:

Cut production costs 50 per cent.

Tripled output on some models.

Added 200 bushels of shelling capacity per hour to machines formerly rated at 100 and 300 bushels.

Made it possible to produce a machine that will shell 1200 bushels an hour.

Released riveting presses for other work.

Two lengths of studs, welded in a spiral pattern, replace square rivets

Held at 3000°F for five hours, these four brick, commonly recommended to resist high temperatures, show varying effects. Samples 1, 2, and 3 softened and slumped to different degrees, indicating loss of usefulness even below this temperature. Sample 4, a Mullfrax® electric furnace mullite refractory, is unaffected by the heat.

fourth in a series . . . **HEAT RESISTANCE**

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Heat Resistance—Exposed only to heat, Carborundum's Super Refractories can actually be used with complete safety at temperatures above 3000°F. Long before such temperatures are approached, even high heat duty and super-duty firebrick lose much of their usefulness. That's because they begin to soften several hundred degrees below their theoretical safe limits. Not so Carborundum's Super Refractories. Their strength and rigidity are maintained close to their theoretical limits.

In practice, of course, you must contend with many more conditions than heat alone. Corrosion, thermal shock, load, abrasion, erosion, etc., are usually combined with temperature. This combination of conditions may tend to lower heat resistance of refractories. That's why a refractory cannot be selected solely on its ability to withstand temperature. It also explains the reason Carborundum offers so many specialized refractories.

Heat resistance is thoroughly explored in the forthcoming issue of Carborundum's new magazine "Refractories." Send for your copy today.

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Cost comparison: Investment casting in air, argon and a vacuum

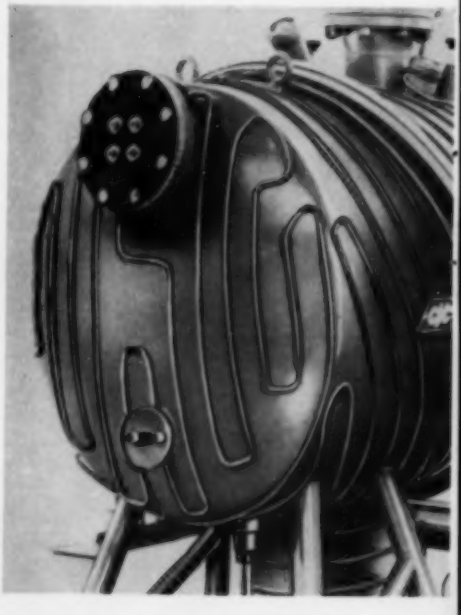
CONDITIONS:

1. One-half lb casting
2. Eight castings per mold
3. Fifty per cent yield not including rejects
4. Thirty per cent rejects for high alloy castings and fifteen per cent rejects for low alloy castings
5. Thirty per cent margin for high alloy material and twenty per cent margin for low alloy materials
6. Vacuum metal cost—$3 per lb over comparable air melted alloy
7. Figures include depreciation and overhead
8. Vacuum investment furnace—initial cost $60,000—capable of pouring ten flasks per hour

Item	High Alloy Material			Low Alloy Material		
	Air	Argon	Vacuum Remelt	Air	Argon	Vacuum Remelt
Mold cost	$35.00	$35.00	$35.00	$28.00	$28.00	$28.00
Metal cost per mold	16.00	40.00	40.00	3.20	27.20	27.20
Melting cost per mold	2.60	5.20	9.70	2.60	5.20	9.70
Cleaning cutoff and inspection	18.00	18.00	18.00	8.00	8.00	8.00
Total cost	71.60	98.20	102.70	41.80	68.40	72.90
Minus metal returns	6.24	6.24	6.24	.55	.55	.55
	65.36	91.96	96.46	41.25	67.85	72.35
Margin	19.61	27.59	28.94	8.25	13.57	14.47
	84.97	119.55	125.40	49.50	81.42	86.82
Selling price of casting	$15.17	21.35	22.39	$ 7.28	11.97	12.77
Increase in price over air melting		40.3%	47.7%		64.4%	75.3%

Investment Casters Eye the Vacuum

More tough jobs are being assigned to vacuum produced metals. Investment casters are turning to this method to keep up with the parade. Here's one producer's experience



"NO investment caster should be without a suitable vacuum furnace. He owes it to himself and to his company to make this investment in the future of his industry."

Those words were spoken at a recent meeting of the Investment Casting Institute by F. Kenneth Iverson, chief metallurgist, Cannon-Muskegon Corp., Muskegon, Mich. He feels that the properties of castings are significantly improved by the vacuum processes.

Methods — There are two ways to make investment castings from vacuum alloys: 1. Remelting vacuum alloys in an inert gas. 2. Melting and pouring in a vacuum.

The inert gas (argon) system has a number of advantages, most of which center in the equipment. An existing furnace can be modified for only $400 to $500.

Unless the furnace is tight, argon costs are high. Some alloys lose their vacuum properties in argon. Quality is hard to control.

Alternative — Although vacuum equipment is costly and production slow, castings can be made economically and efficiently by re-

melting vacuum alloys. No additions are needed.

It is possible to use prime metals rather than vacuum alloys for charging, but is not recommended because of control difficulties; production time often is twice that of vacuum alloys.

Problems — The most difficult problem is controlling the outgassing of the mold during pouring. Even though violent, it is apparently not due to a reaction between the metal and the investment material.

These steps reduce the difficulty:

1. Preheat the mold to 1800-1900° F. Place it inside the preheating chamber of the vacuum furnace before pumping down. While the charge is being melted, the mold temperature drops to that of the preheat chamber.
2. Or place a pouring cup on the mold and raise the riser 2 to 3 in.
3. Or vent the mold. Experiment with vent type and location.

Technique—The work at Cannon-Muskegon indicates that little or no change is needed in gating or risering. Not all dip coatings are satisfactory; sodium silicate, for example, is violently reactive when heated rapidly in a vacuum.

A 50-lb vacuum furnace for investment casting. Chamber pressure: Under 10 microns in 3 minutes. With a 30 kilowatt generator, it melts 50 lb of alloy in 30 to 40 minutes

How To Buy a Special Machine

Here are a number of tips offered by a major builder. For example, don't tie the designer's hands on machine type. Freed, he may come up with something better

IF YOU'RE buying special machinery, your responsibility doesn't end with an appropriation and a signature.

Builders of specials point out that there's no substitute for help from buyers. Here are some major areas where builders feel the buyer can save himself some grief and probably some money.

Define the Problem—It's up to the buyer to know exactly what the new machine will have to do. Leo Gajda, director of engineering, Snyder Tool & Engineering Co., Detroit, says: "The machining condition of the part at the point being considered has to be known."

The type of operations and the degree of machining also have to be decided ahead of time. With these, the builder can figure what he'll need for locating surfaces, and he'll also avoid expensive precision where it's not needed, will build it in where it is needed.

- Review part tolerances. If they are unnecessarily close, you'll pay for it in terms of uncalled for precision.
- Know the production rate at which the part is to be produced, and, Mr. Gejda warns, don't exaggerate it. The penalty could be increased machine costs.
- Be realistic about delivery dates. This is a "sometimes sore point" with many builders. They don't appreciate "cushions." Mr. Gejda also asks that "once the delivery schedule is established . . . don't arbitrarily step in and speed it up at the drop of a hat."
- Don't be too firm about machine type. New ideas frequently come when the designer has room to speculate. You may miss a good bet by pinning him down too soon.
- Don't ask for the overnight quotation. Give the builder some time to think. The penalty for a fast quotation may be sketchy designs and overcushioning on price.
- Keep the builder posted on essential design changes, but don't insist that he make them immediately. Some builders prefer to pick their time for changes. Snyder frequently calls a "change holiday" that follows the general design job. It gets all changes completed at once. Otherwise, frequent and unpredicted halts in design to make changes can make costs skyrocket.

Two Teams—Hitting at the importance of a smooth program in keeping costs down and in getting maximum machine performance, Mr. Gejda cited the need for teamwork between the buyer and the supplier.

He figures the huge design, building and installation program is often carried out in "an extremely short time. How successful the operation is depends entirely on the co-operative spirit between a buyer and a supplier team."

Business Is Booming

Faced with a mounting backlog, another major builder of special machines told STEEL he'll add about $1.5 million worth of new, big machines to his own production facilities. It should boost his capacity by about 50 per cent.

The machines will offset increases in orders. They also will alleviate a personnel problem. "In a precision industry where every machine is virtually a prototype, you can't just add engineers and shop personnel to the payroll and have them all be qualified."

The new machines should be in operation in early 1957.

MUELLER BRASS CO. improves LENSOMETER lower cost

FORGED PART APPROXIMATELY ½ SIZE

Precision and extreme accuracy are vitally important functions of the Lensometer, manufactured by the Instrument Division of the American Optical Company, Buffalo, N. Y. The Lensometer is used to determine the focal strength and axis of an optical lens and, consequently, must be extremely precise in operation to provide accuracy and uniformity in lens prescriptions.

Forgings made by the Mueller Brass Co. play an important role in the construction of the Lensometer and contribute to its outstanding performance. Formerly, the body of the Lensometer was produced from *three* sand castings, but these now have been replaced by just *two* forgings. Naturally, this simplifies assembly, and the big forged bronze main support arm, shown above, along with the lens support bracket insures the constantly accurate alignment of the instrument. During the first year when forgings were used instead of castings, American Optical not only recovered the initial tooling costs but also realized considerable savings on each Lensometer produced. This is another good example of the way Mueller Brass Co. forgings can benefit a product two ways . . . better performance and lower costs. Chances are, your product can likewise be improved at a savings to you if you specify brass, bronze or aluminum forgings made by the Mueller Brass Co.

FORGING

at substantially

• WRITE TODAY FOR THE ENGINEERING MANUAL YOU NEED

Mueller Brass Co. Forgings Engineering Manual H-58563 ☐

Tuf-Stuf Aluminum Bronze Alloys Engineering Manual H-58563 ☐

600 Series Bearing Alloys Engineering Manual FM-3000 ☐

Copper Base Alloys in Rod Form Engineering Manual FM-3010 ☐

METALS AND ALLOYS REVIEW

by FRANK M. LEVY

Vice-President and Director of Research

One of our most interesting series of alloys is the group which we market under the tradename "Tuf-Stuf" . . . a group of aluminum bronze alloys with range and flexibility to meet the most demanding needs. They are high copper base alloys containing from 9% to 13% aluminum and varying amounts of iron, nickel and manganese. Being free of zinc, they are not subject to dezincification. Tuf-Stuf alloys have a low coefficient of friction, good wearing qualities, high tensile strength, high hardness and the ability to withstand heavy pounding. Some of the alloys can be hardened by heat treatment. In the harder grades, these alloys are used for heavy duty service where high compressive loads are encountered and where lubrication may be scant. Present day increases in operating speed of modern machine equipment and the economy of little or no machine "down" time has made Tuf-Stuf popular in the machine tool industry. It is used in a multitude of applications where resistance to wear is important, such as: Drill Jigs, Feed Nuts, Rollers, Cams, Collets, Gibs, Gears, Boring Bar Guides, Lead Screw Nuts and Clutch Shifter Forks. Also, because of their ability to withstand higher stresses and resist season-cracking, these alloys are ideally suited for threaded nuts and bolts and pole-line hardware.

The unusual physical properties of the Tuf-Stuf series have made it particularly useful in the chemical and allied industries. These alloys combine the strength and ductility of medium steel with high resistance to corrosion by many chemicals. Tuf-Stuf alloys will not only resist oxidation at elevated temperatures, but will also retain a greater portion of their strength and hardness at these temperatures than will the copper zinc alloys. These properties make them ideal in the aircraft industry for valve seat inserts, spark plug bushings, valve guides and propeller hub cones.

Tuf-Stuf alloys are supplied as forgings, rod or screw machine products. As forgings the grain structure can be controlled to produce parts that are strongest at points of greatest stress and strain. Relatively intricate shapes can be forged to closer tolerances than sand castings. Where appearance is a factor, a forging may easily prove more economical since a minimum amount of machining, buffing or polishing is required before finishing.

If you'd like more information about this series of alloys, drop me a line or better yet, send me your sample part or blueprint and an explanation of its use and we'll be glad to submit our recommendations.

MUELLER BRASS CO.

PORT HURON 19, MICHIGAN

178

THESE MEN ARE MAKING SURE YOU GET

Top Quality METALS

Wrap to PROTECT with THILCO papers

AND Advertise THEM, TOO at little extra cost!

All THILCO functional papers can be furnished with print-decorated identification that adds selling power for very little extra cost. In fact, it's the lowest cost advertising you can buy.

SHEETS, STRUCTURAL, COILS, TUBES OR FINISHED PRODUCTS—

There's a Thilco Wrap for the Job!

Protective papers for steel and non-ferrous metals can be as different and varied as the products they wrap. Only Thilco makes all types and only Thilco provides them with overall trade-mark identity.

FOR INSTANCE — If your problem is one of safeguarding against damaging weather elements, Thilco can give you as tough and durable, reinforced asphalted papers as you require.

FOR INSTANCE—If you'd like to protect against corroding moisture-vapors and gases, Thilco has a complete range of wax treated and polyethylene treated barrier papers. In fact, there's no protective paper line so complete, so versatile, so adaptable to solving any wrapping problem you may have. Get to know Thilco papers — Write for complete information.

FOR INSTANCE — If your problem is preserving protective oils and coatings from leakage or evaporation, Thilco has any number of glassines and greaseproofs or REPEL treated papers ideally suited for the job.

Thilco Protective Papers include

- WRAP-DRI Waterproof protective papers
- THILCO-TUF Stainproof laminated papers
- VAPOTITE moisture-vapor barrier papers
- POLY-COATED and special treated papers
- MG and MF natural and colored krafts
- GLASSINE and greaseproof papers
- SPECIALTY BAGS and case liners

Write for sample kit of PRINT DECORATED Protective Papers

THILCO

Functional Papers FOR PROTECTION THAT COUNTS!

NEW YORK • CHICAGO
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THILMANY PULP & PAPER COMPANY
KAUKAUNA - WISCONSIN

Wire Goes in Pails

Steel pails have replaced the spool in the packaging of magnet wire at one wire plant

A STEEL PAIL has solved three troublesome problems of the magnet wire industry — packaging, shipping and de-reeling.

Developed co-operatively by Jones & Laughlin and Rea Magnet Wire Co. Inc., Fort Wayne, Ind., the pail is being used by Rea to package magnet wire.

Spools — In the past, finished wire has been packaged on spools. The size and capacity of spools are limited by the tensile strength of the wire, since the wire is used to rotate the spool in de-reeling.

The small capacity of the spools means that the winding machines at the user's plant are shut down frequently for reloading.

COIL WINDING MACHINE
. . . takes magnet wire out of pails

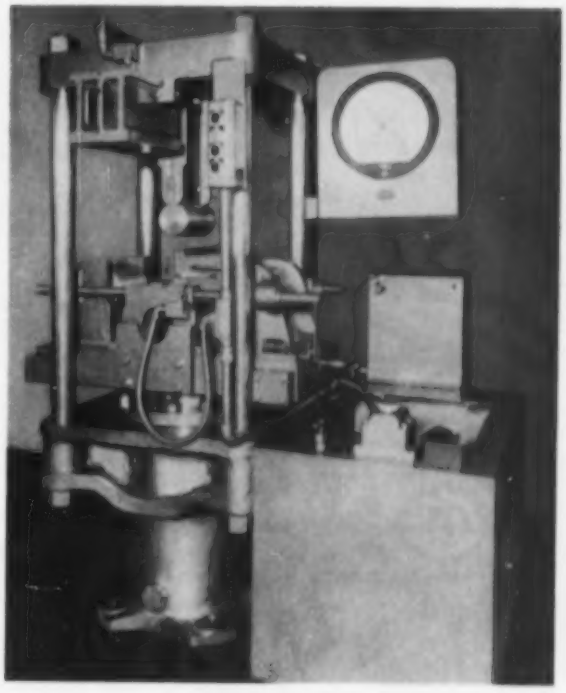
Pails—A 6 in. spool holds 9 to 10 lb of magnet wire. The steel pail holds 90 to 100 lb. The use of the pail results in a 90 per cent reduction in down time for each 100 lb of wire used. Since many winding machines use several hundred pounds of wire in an 8-hour shift, savings are considerable.

The wire pail also eliminates the need for expensive, high-polished cast spools—customers must make a deposit on them. If damaged, they must be reworked.

Protection — The steel pail, made of 26 gage steel, is a rugged shipping container and may be used as a no-deposit, nonreturnable item.

The heavier sizes of magnet wire have been de-reeled from the pails at speeds up to 5000 fpm.

Press Makes Cold Bending Tests Up to 150,000 Lbs.



The Baldwin makes cold bending tests quickly. It can handle low carbon steel bars up to 2 in. square or 2 in. in diameter in lengths from 5 to 24 in. It tests flats up to 4 in. wide and 1 in. thick in the same lengths.

The testing machine is hydraulically operated at controllable table speeds of 1½-in. or less to 10 in. a minute. Maximum upward stroke is 11 in. Loads are measured by an Emery bourdon tube indicating system with a dial 12 in. in diameter which is graduated in 500-lb divisions.

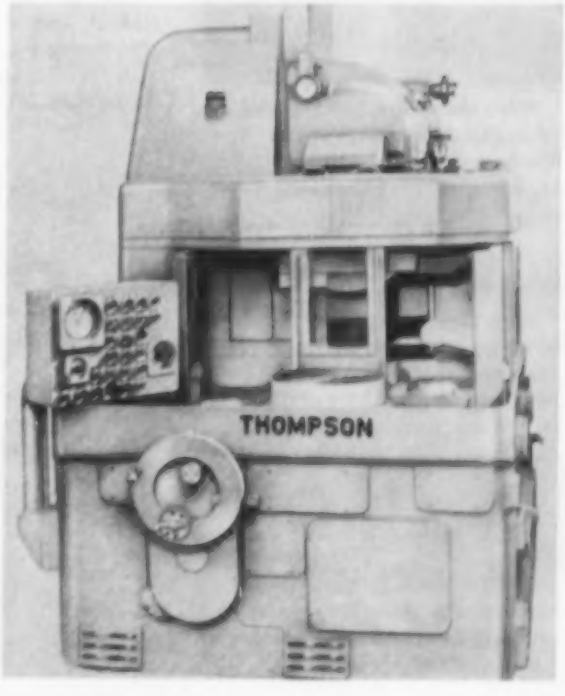
After making a V-bend with rollers, sliding platens can be used to bend specimens 180 degrees or flat on themselves.

Platens and the machine structure are designed to withstand the transfer of off-center flattening loads. Overloads are prevented by limit switches and an overload pressure relief valve.

Three pairs of support rollers, 5, 5½ and 6 in. in diameter, are furnished. The lower support stand has a sliding platen which can be used in the center of the machine without removing the bending pins.

An assortment of bending pins, from 3/32 to 8.46-in. in diameter, is provided. *Write*: Baldwin-Lima-Hamilton Corp., Philadelphia 42, Pa. *Phone*: Saratoga 9-9161

Twin Rotary Circular Grinders Reduce Cycle Time



The line of TR grinders has worktable surfaces from 6 to 24 in. Cycle time is reduced because the operator loads one magnetic chuck at the front position while another part is being ground automatically in the rear position.

Typical jobs include automotive gear clusters, aircraft turbojet blades, automotive transmission gear faces, circular metal saws and other intricate parts.

A pushbutton starts the automatic cycle. The wheelhead moves downward and rapidly removes a predetermined amount of stock. The spark out cycle follows. When the wheelhead returns to the up position, the operator unloads the ground parts and the grind cycle starts automatically in the rear position.

Free loading time allows the operator to arrange other parts or to operate other machines.

A wheel 14 or 20 in. in diameter gives horizontal wheelhead grinding to controlled size. The feed screw is compensated automatically.

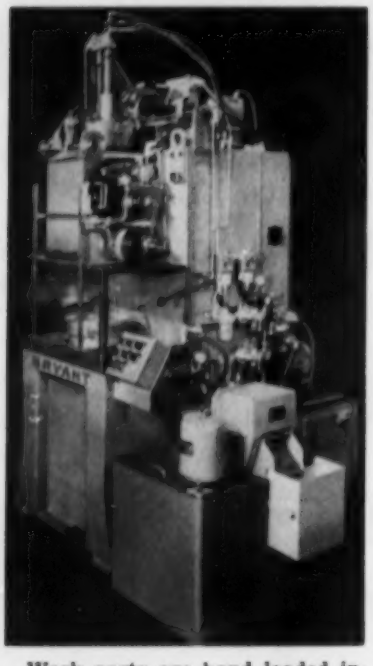
Automatic wheel truing and spark out assure accuracy of finish. The worktable is supported on a large bearing surface for maximum rigidity. An antifriction elevating nut assures positive vertical feeding action. *Write*: Thompson Grinder Co., Springfield, O. *Phone*: Fairfax 3-3723

NEW PRODUCTS and equipment

Vertical Cam Grinder

This version of the Centalign automatic internal grinding machine has its machining functions controlled by programming cam sets which can be interchanged readily.

A simplified servocontrol hydraulic system combines the advantages of both cam and hydraulic machine operation to give accurate machine control and smooth operation.

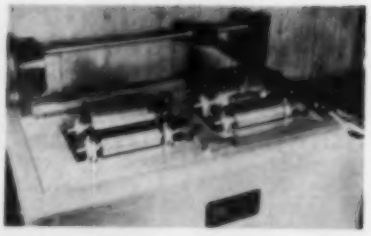


Work parts are hand loaded into a chuck rotating at 100 rpm. Stock removal is 0.015 to 0.020-in. *Write*: Bryant Chucking Grinder Co., Springfield, Vt.

Lapping Machine

With this centerless machine, bearings, gages, bearing races, bushings, shafts and cylinders can be lapped to tolerances of 0.000010-in. Worn gages can be salvaged by lapping them to the next smaller size.

Two power-driven rollers do the work. The smaller roll turns the workpiece which is placed between the rolls. Pressure is applied by a hold-down device. The amount of pressure determines the amount of stock removed.



By adjusting the space between the rollers, the machine will lap any diameter from 0.010 to 6.000 in. Finishes are 1 microinch or less. *Write*: Size Control Co., 2500 W. Washington Blvd., Chicago 12, Ill. *Phone*: Monroe 6-6710

Voltage Recorder

Variations in steel mill roll speeds are recorded with the differential voltage recorder.

Two instruments are available. One gives a direct reading of the feet per minute draw, the stretch of the steel. The other recorder measures and indicates the ratio between roll speeds.

The recorders are unaffected by changes in operating speeds; they record only draw and ratio during speed-ups or slowdowns. *Write*: General Electric Co., Schenectady 5, N. Y. *Phone*: Franklin 4-2211

Abrasive Cutting

The Hi-Boy cuts up to 12-in. pipe. A long vise chain is used to hold larger material.

In cutting pipe from 6 to 12 in., a 14-in. wheel is used, and the pipe is turned. Shapes up to 6 in. and solid stock up to 2½-in. are also cut. Wheel speed is 2400 rpm. The unit can be equipped with a 7½ or 10-hp motor. *Write*: Beaver Pipe Tools Inc., Warren, O.

Electric Power Sweeper

Model 605-E operates with two motors. One is for travel; other powers the brushes and vacuum. The sweeper can operate for 8 hours without recharging.

In open areas, the machine can sweep up to 70,000 sq ft an hour. A three-speed transmission provides gear ratios for top efficiency under every condition.

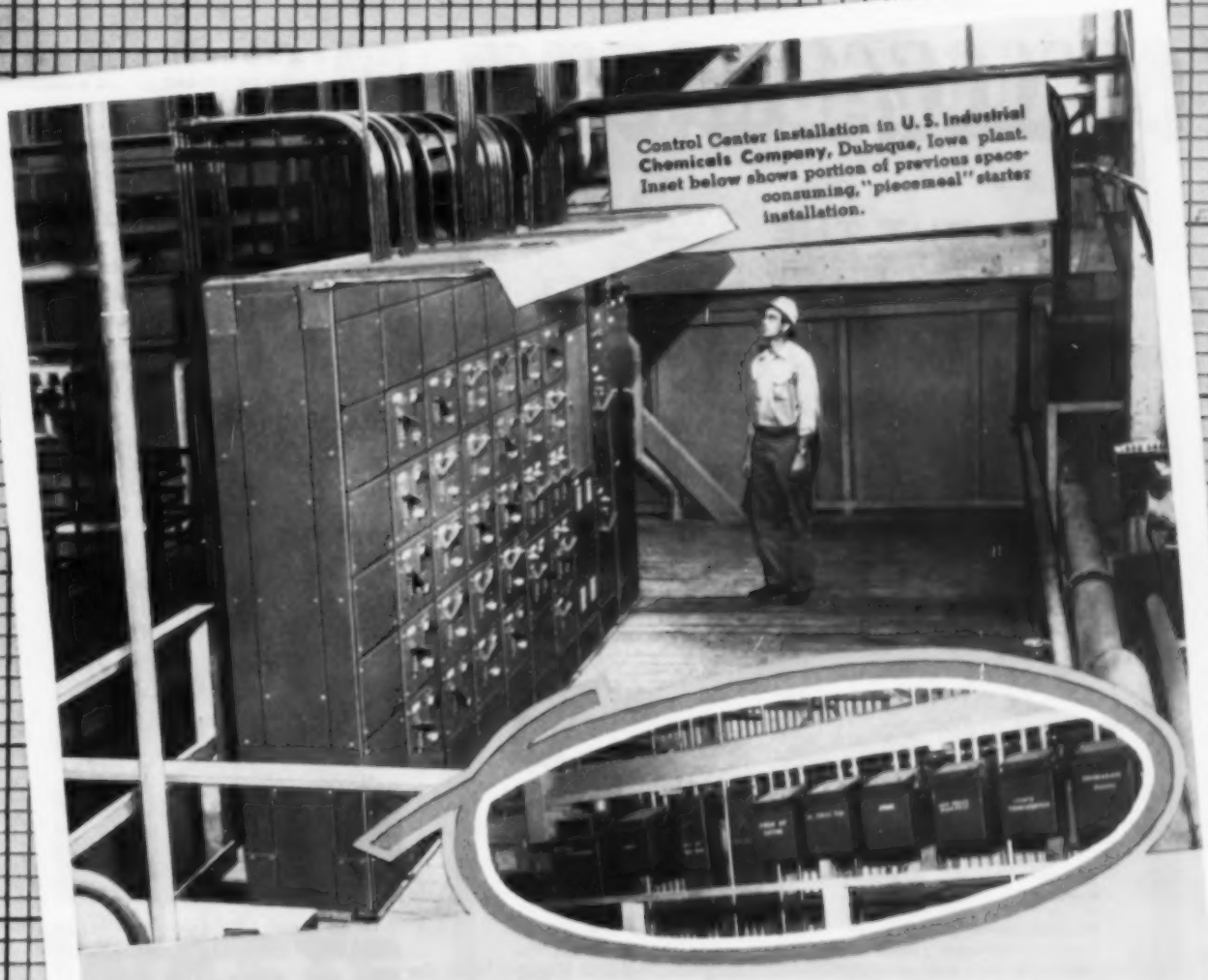
The 36-in. pickup broom has a pressure adjustment to give maximum sweeping with a minimum of broom wear. Side brooms are available. Combined with automotive steering and a 5-ft turning radius, they make close sweeping possible under almost any condition. Sweeping widths are 36, 48 and 60 in. *Write*: Wayne Mfg. Co., 1201 Lexington Ave., Pomona, Calif.

Shaft Straightener

This automatic machine prepares 600 pieces an hour for centerless grinding. Synchronization with the grinders is not needed because a storage chute holding 30 pieces automatically starts and stops the straightener as parts are demanded by the grinders.

Straightness is held to 0.015-in. total indicator reading at the center.

Shafts are fed from a loading and storage hopper to a walking beam conveyor. It carries them to a straightening station where rolls



Control Center installation in U. S. Industrial Chemicals Company, Dubuque, Iowa plant. Inset below shows portion of previous space-consuming, "piecemeal" starter installation.

"COMPARISON convinced us that a SQUARE D Control Center offered us MORE!"

These design features make Square D your logical choice, too...

INCREASED SAFETY because bus bars are fully enclosed, rigidly supported and have ample cross section. Circuits are isolated by individually enclosed plug-in units. Disconnect handle designed for maximum operator protection.

FLEXIBILITY. Individual plug-in units or complete sections are easily added, removed or exchanged. Pushbuttons, pilot lights, and selector switches are readily added to unit doors.

INSTALLATION ECONOMY. All wiring channels are large and accessible from front without removing units. No "wire fishing."

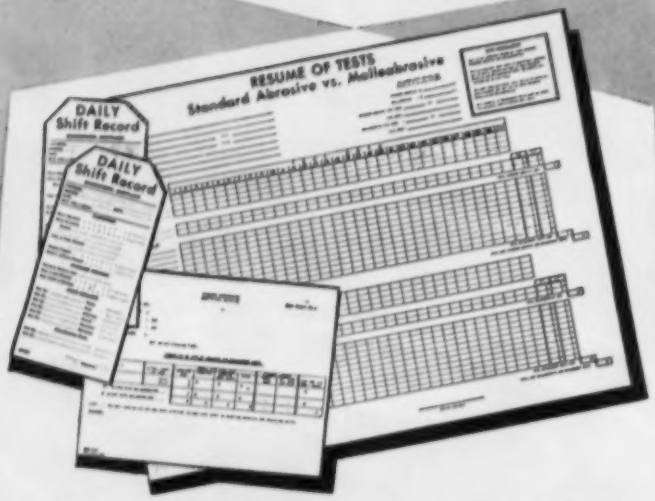
SPACE ECONOMY, TOO. Up to six combination starters fit in a 20" x 20" x 90" section. Plug-in unit heights designed in space-saving increments of 3 inches.

NOW...EC&M PRODUCTS ARE A PART OF THE SQUARE D LINE!

SQUARE D COMPANY

MALLEABRASIVE

PUT THE "test" IN testing!



The only real test of any abrasive is its cost per ton of castings —obtained only by completely recorded use in production.

Malleabrasive was the first metal abrasive to be sold on the basis of recorded production performance in user's plants. The fact is, in its early stages of limited production, we sold it only to those who would agree to run recorded comparative tests. Yes, Malleabrasive really "put the test in testing" — really started all of this testing business!

Malleabrasive's economy has since been proven in hundreds of plants, so there are no restrictions on its sale any more. But— we do say, if extravagant claims and gimmick-guarantees are offered you that some other abrasives are cheaper for you than Malleabrasive, the only way to get the facts is to run recorded tests of both materials. Don't depend on generalities.

Samples of the test record forms used to establish Malleabrasive's economy will be sent on request. Write us.

THE GLOBE
STEEL ABRASIVE COMPANY
MANSFIELD, OHIO

Sold and recommended by Pangborn Corp., Hagerstown, Md.

"NOW IN EASY TO HANDLE 50-POUND DOUBLE BURLAP BAGS"

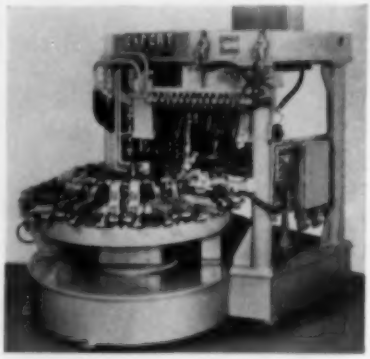
NEW PRODUCTS and equipment

apply a load at the shaft center while the shaft is rotated.

The straightened shafts are checked at a gaging station. Those which are outside tolerance are removed by a reject mechanism. A conveyor advances the others to the feeder. *Write*: Cargill Detroit Corp., 2254 Cole Ave., Birmingham, Mich. *Phone*: Midwest 4-5400

Index Welder

A cam drive which runs continuously controls the indexing and welding sequences of this 12-station welder.

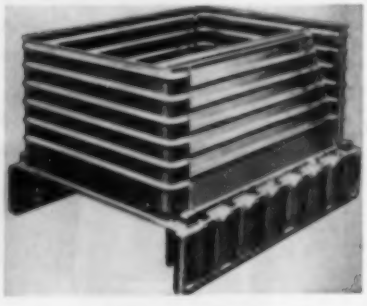


In an hour, 1200 two-piece hinge stampings are put together with nine spot welds. The automatic welder occupies a floor space of about 7 x 8 ft and is about 7 ft high. *Write*: Expert Welding Machine Co., 17144 Mt. Elliott Ave., Detroit 12, Mich. *Phone*: Twinbrook 1-4327

Material Handling Box

Up to 66 per cent of the space needed to store and ship empty boxes is eliminated by the Foldaway. It can be reduced to one-fifth its original size.

The corrugated steel box has



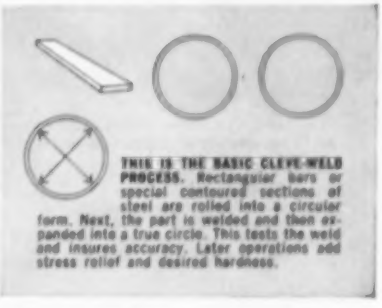
WASTE on overweight cast or forged circular parts can pile up operating expenses. "Slim" Cleve-Weld welded components can cut your costs.

You save three ways on circular parts from Cleve-Weld

1. Waste costs are cut up to 30% over bulky cast or forged parts.
2. Finished machining time is reduced to a minimum.
3. Your overall production is speeded.

From simple gear blanks to special alloy jet rings, the Cleve-Weld Process gives the same results—better performance and reduced costs. In some cases, the savings in machining time and material waste pay for the finished Cleve-Weld part.

Find out the full story on how Cleve-Weld's 45 years of design, metallurgical and production experience can save you money, too. Write, telephone, or send drawings to: Circular Welded Products Sales Department, at the address shown below.



THIS IS THE BASIC CLEVE-WELD PROCESS. Rectangular bars or special contoured sections of steel are rolled into a circular form. Next, the part is welded and then expanded into a true circle. This tests the weld and insures accuracy. Later operations add stress relief and desired hardness.

EXAMPLES OF CLEVE-WELD PROCESS PRODUCTS

JET RINGS | GEAR BLANKS | TRUCK RIMS | MOTOR HOUSINGS | IDLER WHEELS | BANDS | TRUNNIONS

Another AMF Product

CLEVE-WELD PROCESS
RIMS · RINGS · WELDMENTS

CLEVELAND WELDING DIVISION
AMERICAN MACHINE & FOUNDRY COMPANY
West 117th Street & Berea Road, Cleveland 7, Ohio

SEND THIS COUPON NOW

Cleveland Welding Division
West 117th Street and Berea Road
Cleveland 7, Ohio

Please send me your Cleve-Weld Process Brochure.

Name_____

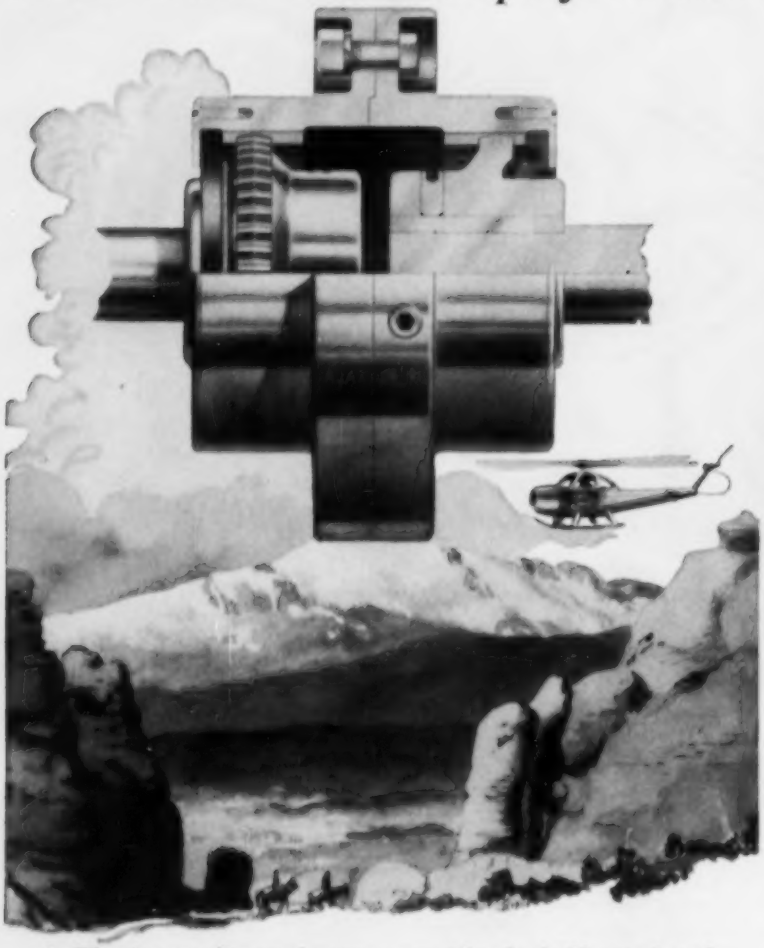
Title_____

Attach to your company letterhead and mail

AJAX

DIHEDRAL COUPLINGS

reach a new **PEAK** *in performance*



▶ The shortest distance between two points is via Ajax equipped helicopter. On September 13, 1955, a Cessna Helicopter driven by a Continental 260 H. P. power plant settled to a landing on the summit of Pikes Peak!

An Ajax Dihedral Floating Shaft Coupling delivered the power and handled the misalignment between motor and vertical drive unit.

This is one more dramatic performance test of Ajax Dihedral Couplings.

They are handling alignment and misalignment problems on difficult installations including steel mills, cranes, oil drilling rigs and a host of other severe installations.

Every man responsible for performance, from design engineer to service manager owes it to himself to get the story on Ajax Dihedral Gear Type Couplings, the greatest improvement in couplings since the beginning of the industry. Write for full information right now.

AJAX FLEXIBLE COUPLING CO. INC.

Representatives in Principal Cities **WESTFIELD, N. Y.**

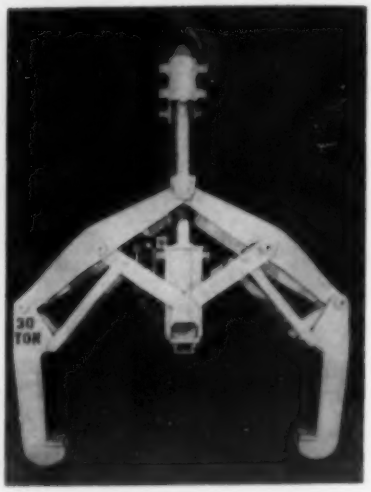
NEW PRODUCTS and equipment

collapsible sides which are easily set up or folded down. A pin and slide bolt arrangement locks the sides to form a rigid box. The unit can be tiered when loaded, unloaded or folded.

The box is tailor-made in various sizes and can be designed for two or four-way fork truck entry. *Write*: Pressed Steel Division, Republic Steel Corp., 6100 Truscon Ave., Cleveland, O. *Phone*: Michigan 1-0810

Motorized Coil Tongs

Horizontal coil tongs, with a capacity of 30 tons, can be used to lift coils up to 76 in. wide where side clearance is limited.



The crane operator controls an electric motor which opens or closes the arms. The arms are parallel to each other at all times.

Also available are models which rotate the coil while keeping the axis parallel to the floor. *Write*: Heppenstall Co., Pittsburgh 1, Pa. *Phone*: Mayflower 1-2000

Chrome Plating Additive

CPA 1800 offers faster plating, a broader operating range of plating solutions and greater covering power. It replaces a portion of the sulphate used in conventional solutions.

CPA 1800 also makes possible the electrodeposition of brighter and harder coatings, simplifies anoding in hard-chrome uses and

Case No. 42

Kemp Immersion Heating Gets Top Results for Signode Steel Strapping Company

How Signode Steel Strapping Co. tempers 650 feet of steel strap every minute

At the Signode plant in Sparrows Point, Md., turning out up to a thousand miles of steel strap daily calls for fast, efficient production line techniques. One highly important phase in the final processing is the tempering bath. Here, Signode called on Kemp Engineers to supply the 15 ton, gas-operated Immersion Melting Pot shown above. Now steel strap is uniformly tempered at the rate of 650 feet per minute.

Kemp Offers More Advantages

By installing Kemp Immersion Heating, Signode benefits in many ways. Unlike underfired pots, Kemp pots are *not* subject to *periodic* and expensive shutdowns . . . won't crack or break. They operate *continuously* at maximum heating efficiency with a ***substantial*** savings in fuel costs. Offer a greater heating surface, faster heat recovery, lower dross formation, even lower room temperatures. At the same time, this Kemp unit enables Signode to eliminate costly temperature override and open flame fire hazards.

Let Kemp Solve Your Problems

These same advantages apply to all types of melting or heating operations. Whether you are engaged in tempering, annealing, descaling, coating, etc., you can rely on Kemp Immersion Heating. Why not find out how Kemp Engineers can help you, save you money?

This 10 ton oval pot is typical of the many Kemp installations now in use. Features Kemp Carburetor, part of all Kemp equipment, to deliver complete combustion . . . without waste . . . without finkering. One-pipe air and fuel feed reduces installation costs, simplifies maintenance.

For more complete facts and technical information, write for Bulletin II 11 to **C. M. KEMP MFG.CO., 405 East Oliver St., Baltimore 2, Maryland.**

KEMP OF BALTIMORE

IMMERSION MELTING POTS

CARBURETORS • BURNERS • FIRE CHECKS
ATMOSPHERE & INERT GAS GENERATORS
ADSORPTIVE DRYERS • SINGEING EQUIPMENT

How to get the "OK" on stainless welds . . . time after time

WELD WITH ARCOS

STAINLESS ELECTRODES

On weld after weld—such as in this refinery tower lining which must resist intense corrosion—Arcos quality controlled electrodes will give you the "right" weld metal . . . easily deposited. If you are looking for sound, low cost, long-life welds—you can rely on Arcos *ELECTROPAKED* Electrodes to produce unquestioned "OK's" time after time. ARCOS CORPORATION, 1500 South 50th Street, Philadelphia 43, Pa.

NEW PRODUCTS and equipment

improves the metallurgical characteristics of the plate.

An increase in cathode current efficiency and the use of higher current densities make plating faster. Bright deposits are obtained over a broad temperature range.

Complex parts are plated easily due to the greater covering power of baths. *Write*: Chromium Chemicals Division, Diamond Alkali Co., 300 Union Commerce Bldg., Cleveland 14, O. *Phone*: Main 1-6100

Lifting Hook

Overlapping jaws prevent this device from opening accidentally under any load condition. The hook comes in 6 and 12 ton capacities.

It is pneumatically operated and electrically controlled. *Write*: GarBro Mfg. Co., 2415 E. Washington Blvd., Los Angeles, Calif. *Phone*: Ludlow 7-5291

Lapping Machine

The 36-in. Lapmaster is capable of generating surface flatness to less than one light band and finishes to 2 rms in short or high production runs.

Inside diameter of the conditioning rings is 14½-in. A roller bar attachment provides shelf space for pressure plates or fixtures.

A fork style agitator is placed at a 30 degree angle in the agitator tank. This facilitates mixing

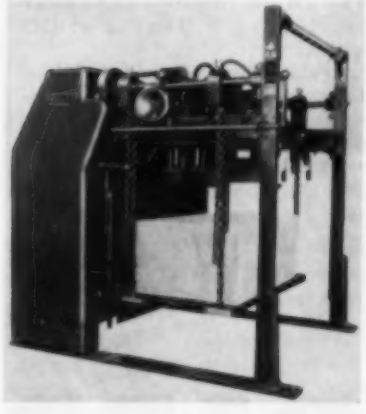
NEW PRODUCTS and equipment

of abrasive when left loaded in the tank overnight and eliminates strain on the agitator motors. *Write*: Department SLC, Crane Packing Co., 6400 Oakton St., Morton Grove, Ill. *Phone*: Orchard 3-6800

Sheet Metal Feeder

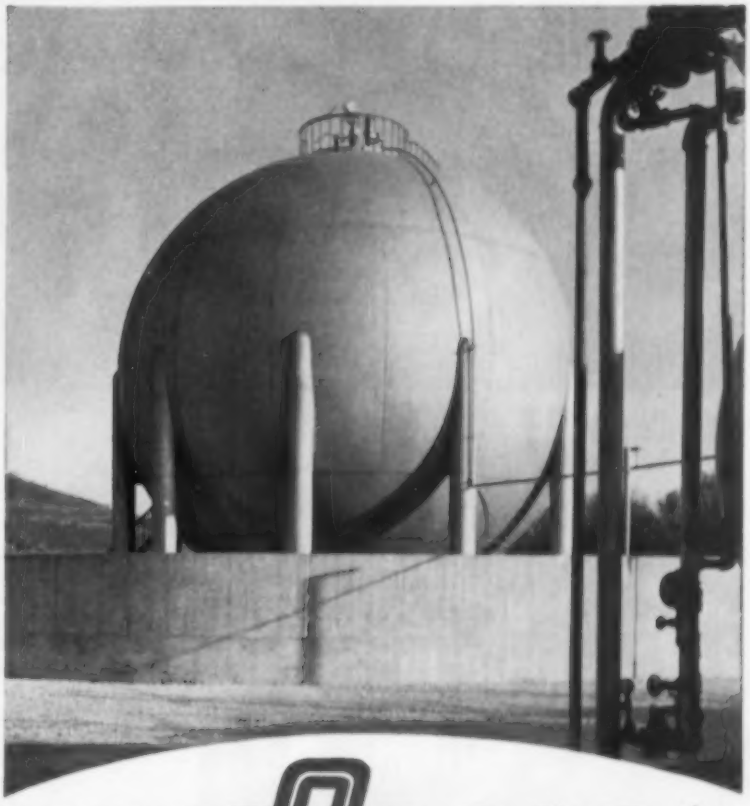
The 6000-lb capacity feeder can handle sheets ranging in thickness from 38 to 20 gage at the rate of 125 a minute.

The feeder automatically separates, lifts, calipers and advances sheets (up to 48 x 44 in.) to the registering or feeding station of the press, coater, slitter, shear or other machine to which it is attached.



It can be equipped for rear or side loading. The flow of sheets can be stopped temporarily without losing the synchronization between the feeder and the machine it feeds. *Write*: Dexter Folder Co., Pearl River, N. Y.

For speed, economy and dependability when welding low-alloy steels...



WELD WITH ARCOS

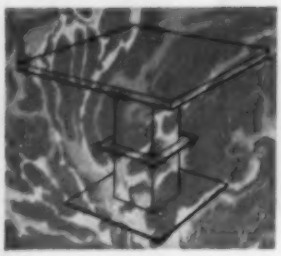
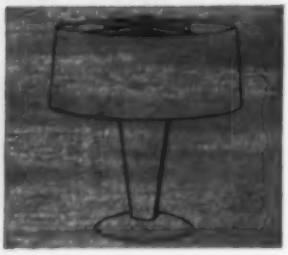
LOW HYDROGEN ELECTRODES

When welds *must be strong*—as in the Hortensphere* pictured above—ARCOS Low Hydrogen Electrodes will do the job. Usable in all positions, they produce uniformly high quality welds to meet the most rigid inspection standards. Time and money will be saved by eliminating preheat and by avoiding costly repair welds. ARCOS CORPORATION, 1500 South 50th St., Philadelphia 43, Pa.

*Trademark registered by Chicago Bridge & Iron Co.

RIGIDIZED TUBING BY STANDARD

customized for you in "1001" patterns

For volume users of tubing—

Hundreds of exciting new patterns in rigidized tubing can be made up to add novel beauty, strength and individuality to your products. Textures and motifs to match fabrics, woods, materials and finishes of all kinds. In round, square, rectangular or special shaped tubing. And manufacturer sharing the cost of design development depending, of course, on volume of order. Custom patterns such as—nubby weaves, rustics, striateds, knotty pine, corrugated, herring-bone, ripple wood, swirls, scrolls, geometrics—can be designed to your specifications. Gleaming chrome or duo-tone enamel finishes. Unlimited pattern designs! Unlimited uses! You are limited only by your own imagination. Sizes range from ½" to 5½" OD in 16 gauge and lighter carbon steel tubing . . . and to 4" OD stainless steel.

Standard also offers full line of carbon and stainless tubing and pipe—for everything from simple *structural* to precision *mechanical* and *pressure* applications.

FREE 8-page folder on all Standard products. Write to address below.

STANDARD

THE STANDARD TUBE COMPANY

24400 PLYMOUTH ROAD • DETROIT 39, MICHIGAN

Welded stainless tubing and pipe • Welded carbon steel mechanical • Boiler and Heat Exchanger • Exclusive rigidized patterns • Special Shapes • Steel Tubing—Sizes: ½" OD to 5½" OD —.028 to .260 wall • Stainless—Sizes: ¼" OD to 4" OD—.020 to .154 wall.

NEW Literature

Write directly to the company for a copy

Cam Limit Switch

Bulletin 1600B, 8 pages, describes a rotary cam limit switch for mechanical presses. Danly Machine Specialties Inc., 2100 S. Laramie Ave., Chicago 50, Ill.

Beryllium Copper

Uses of high conductivity beryllium copper strip are given in a 4-page bulletin. Beryllium Corp., Reading, Pa.

Shock Vibration

Bulletin SVC-55, 4 pages, presents the theory of vibration isolation and shock absorption. Industrial Division, T. R. Finn & Co. Inc., 200 Central Ave., Hawthorne, N. J.

Overhead Cranes

Bulletin U-200-1, 16 pages, covers a line of underhung cranes with spans up to 50 ft. Chicago Tramrail Corp., 1330 S. Kostner Ave., Chicago 23, Ill.

Gray Iron Castings

A 4-page bulletin describes the advantages of electric furnace iron in castings. Belle City Malleable Iron Co., Racine, Wis.

Tool Catalog

Catalog 11 describes end mills, end mill holders, counterbores, countersinks and deburring tools, angular cutters, sharpening fixtures and high speed steel and carbide form tools. Weldon Tool Co., 3000 Woodhill Rd., Cleveland 4, O.

Fasteners

Quarter-turn fasteners for quick, positive locking of removable sections are described in a 12-page bulletin. Southco Division, South Chester Corp., 200 Industrial Highway, Lester, Pa.

Industrial Insulation

Pipe and block insulation for temperatures between 100 and 1600°F are described in a 4-page bulletin. A 6-page bulletin covers an 85 per cent magnesia insulation. Eagle-Picher Co., 900 American Bldg., Cincinnati 2, O.

Cylindrical Grinding

Folder 5-56, 4 pages, presents a grinding concept to overcome chatter, wheel marks, out of roundness and

Photos courtesy of Columbus Dispatch

Kinnear Rolling Doors

Here's double-barreled doorway efficiency and protection!

A Kinnear Steel Rolling Door and Rolling Grille in the same opening! Both open *upward*, coiling into a small space above the doorway.

When the grille alone is closed, it bars intruders without blocking light, air, sound, or vision.

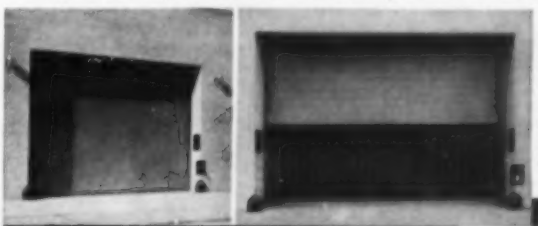
When the Kinnear Rolling Door is closed, its rugged curtain of interlocking steel slats gives extra protection against weather, intrusion, and fire.

With both door and grille closed, a *double* steel barrier repels vandals, thieves, or troublemakers.

Separately or together, the door and grille can be raised or lowered by push button. When opened, they clear the entire doorway, and stay completely out of the way. Whether opened, closed, or in action, they never take up usable floor, wall or ceiling space.

For safety, eye-appeal, efficiency and protection at doorways of any size, in new or old buildings, with any architecture or building material, you get top value with Kinnear Rolling Doors. Their *coiling upward action* has been proved by more than half a century of time-saving, space-saving, low-cost performance. Write today for full information.

HEAVILY Galvanized for lasting protection, Kinnear Steel Rolling Doors are thoroughly coated with 1.25 oz. of pure zinc per square foot of metal (ASTM Standards) then treated with Kinnear's special Paint Bond to assure quick firm full-coverage of field applied paint.



The neat, trim appearance of Kinnear Rolling Doors and Grilles is evident in the new and modern building housing the newspaper printing presses of the Columbus (Ohio) Dispatch.

KINNEAR ROLLING DOORS

Saving Ways in Doorways

The KINNEAR Mfg. Co.

FACTORIES

1780-1800 Fields Avenue, Columbus 16, Ohio

1742 Yosemite Ave., San Francisco 24, Cal.

Offices and Agents in All Principal Cities

THE HOME OF AMERICA'S FIRST IRON WORKS

...is a choice industrial home for your plant

"IRON BY WHITSUNTIDE NEXT." That was the promise John Berkeley sent to the Virginia Company in 1622 from his iron works on Falling Creek. Sadly, he and his plant vanished in the Indian massacre of that year. But his smelter was the first in the nation, and marked the earliest industrial development of today's fast-growing Richmond-Petersburg-Hopewell triangle.

FACTORY PLUS FACTORS in this area range from conservative Southern manpower to a mild Southern climate. And here you get these competitive advantages close to the great northern markets, with favorable rates to the Mid-west.

FIVE MAIN LINE RAILROADS and 56 truck lines roll in coal, chemicals, lumber, resin, peanuts, soybeans at short-haul cost. Hampton Roads opens world markets and sources of supply. And a deepwater channel brings ocean freighters directly to your plant.

AMPLE ELECTRICITY at low cost flows from VEPCO's modern power network . . . with 300,000 kilowatts of new capacity added since 1954, and 300,000 more now under construction. For complete facts on taxes, zoning, water . . . or for confidential help in finding a specific type location . . . write or phone VEPCO, serving the TOP OF THE SOUTH.

VIRGINIA ELECTRIC and POWER COMPANY

Clark P. Spellman, Director—Area Development
Electric Building, Richmond 9, Virginia • Phone: 3-4261

NEW LITERATURE

costly operations needed for superfinishing and lapping. Ready Tool Co., 554 Iranistan Ave., Bridgeport 5, Conn.

Tool Control

A tool board for machine tool users is described in a 4-page bulletin. Seibert & Sons Inc., Chenoa, Ill.

Wrought Iron Pipe

Uses of this product in buildings are presented in a 16-page booklet. A. M. Byers Co., P. O. Box 1076, Pittsburgh 30, Pa.

Unit Heaters

Specifications and performance data for horizontal and vertical unit heaters are given in 36-page bulletin 700A. American Air Filter Co. Inc., 215 Central Ave., Louisville, Ky.

Lathes and Shapers

Screw cutting and turret lathes, shapers and their attachments are specified in a 24-page catalog. Lathe Division, Logan Engineering Co., 4901 W. Lawrence Ave., Chicago 30, Ill.

Handling Equipment

Various models of magnesium hand, platform, shelf, bin and transfer trucks are described in a 12-page bulletin. Brooks & Perkins Inc., 1950 W. Fort St., Detroit 16, Mich.

Explosion-Proof Motors

Bulletin GEA-6341, 8 pages, describes 1-to-30-hp induction motors which are for use in hazardous locations. General Electric Co., Schenectady 5, N. Y.

Refractories

Bulletin 105, 4 pages, describes a dense, stiff, mud type refractory and a dry press brick that is easily cut. Ironton Fire Brick Co., Ironton, O.

Special Saw

A self-propelled tool that saws concrete is described in folder TCS-3. Robert G. Evans Co., 7204 Wyandotte, Kansas City 14, Mo.

Steel Tubing

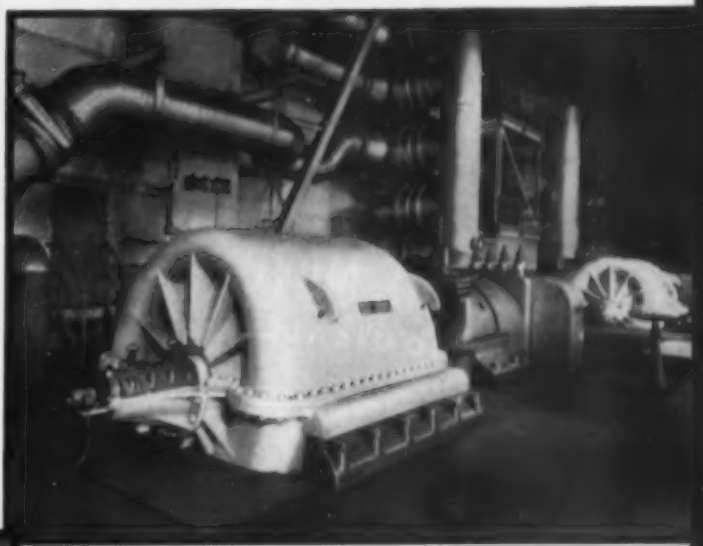
Advantages of resistance welded, carbon steel tubing for condensers and heat exchangers are described in bulletin TB-412, 6 pages. Tubular Products Division, Babcock & Wilcox Co., Beaver Falls, Pa.

Carbon for Cupolas

Catalog section S-5450 gives the chemical and physical advantages of amorphous carbon for neutral re-

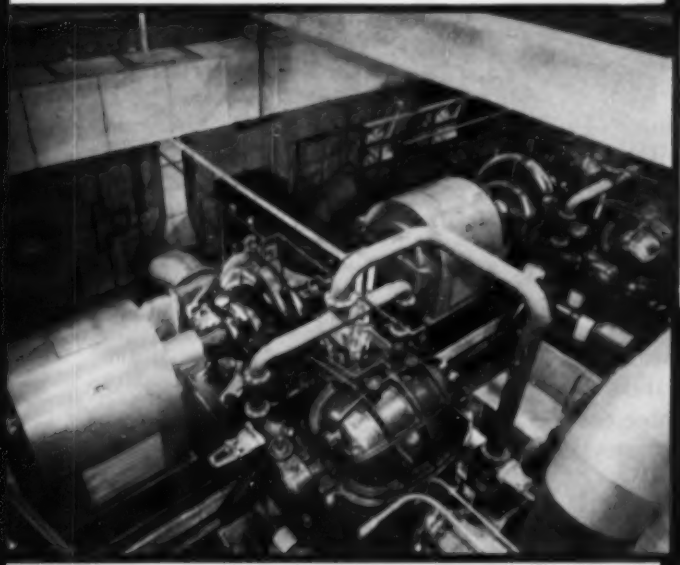
DE LAVAL
CENTRIFUGAL BLOWERS AND PUMPS

stay on the line for years at Jones & Laughlin

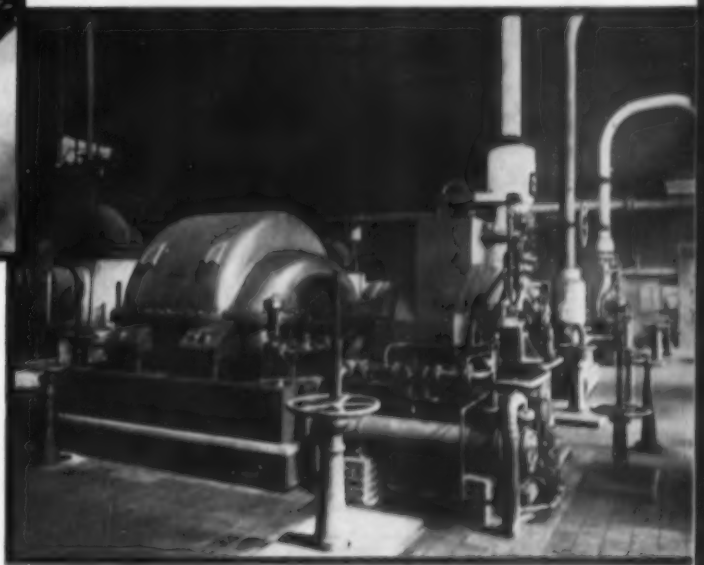


Jones & Laughlin reports: *"We have been using De Laval equipment for many years, and from our experience we have learned that De Laval blowers and pumps are inexpensive to maintain. Service is excellent. We can get spare parts quickly."*

Three De Laval 22,000 gpm motor-driven pumps are on the job at Jones & Laughlin Steel Corporation in Pittsburgh, Pa. These units are used to pump river water to the open hearth and general mill. Installed in October 1951, these three pumps "have not had any downtime at all since their installation except for periodic inspections," Jones & Laughlin reports.



These two De Laval centrifugal blowers, each rated at 100,000 cfm, are in use 24 hours per day, seven days per week except for a yearly inspection period. Since installation, there has been only 24 hours downtime in one of these blowers with a maintenance cost of about $400. "That's very little for this type of equipment," says the Jones & Laughlin blower room foreman.



This is one of three De Laval gas exhausters, operating at 48,000 cfm around the clock. Two of these units can handle maximum capacity; the third is used as a spare. Jones & Laughlin says, "Without good gas exhausters you would have to 'bee hive' (open the top and permit the gas to go free), thus losing our by-product."

Send for Bulletin 0504

DE LAVAL *Pumps and Blowers*

DE LAVAL STEAM TURBINE COMPANY
860 Nottingham Way, Trenton 2, New Jersey

It takes a *high efficiency* electric hoist to maintain today's production schedules. It takes a *tough* hoist to handle loads day-in, day-out without "down time." It takes a *two-brake* electric hoist to assure maximum safety and accurate spotting.

Invest in a Series "600" 'Load Lifter' Electric Hoist and you have all these advantages — and more. This powerful production tool can lift a 1,000-lb. load at 30 FPM. It is simply designed and ruggedly built with few parts — does a job and stays on the job. The automatic brakes operate fast to give you perfect load control. Either one alone can hold the full load. And, the Series "600" provides the extra safety of only 24 volts at the push buttons.

From rugged aluminum alloy frame to lower block, the Series "600" is top quality you can depend on for years of trouble-free service. ½ and 1-ton sizes available. Choice of suspensions, including motor-driven trolley. *Ask your "Shaw-Box" Distributor for details or write for Bulletin 408.*

MAXWELL MANNING & MOORE INC. MM&M TRADE MARK

'Load Lifter'® ELECTRIC HOISTS

MANNING, MAXWELL & MOORE, INC.

MUSKEGON, MICHIGAN

Builders of "SHAW-BOX" and 'LOAD LIFTER' Cranes, 'BUDGIT' and 'LOAD LIFTER' Hoists and other lifting specialties. Makers of 'ASHCROFT' Gauges, 'HANCOCK' Valves, 'CONSOLIDATED' Safety and Relief Valves, 'AMERICAN' and 'AMERICAN-MICROSEN' Industrial Instruments, and Aircraft Products.

NEW LITERATURE

fractory uses in cupolas. S-5455 describes front slagging spout installation and maintenance. Department E, National Carbon Co., 30 E. 42nd St., New York 17, N. Y.

Underdrive Presses

Single, double and triple action presses with capacities from 400 to 2000 tons are described in a 32-page catalog. Danly Machine Specialties Inc., 2100 S. Laramie Ave., Chicago 50, Ill.

Bronze Electrodes

Bulletin W-25a, 4 pages, gives the uses and properties of five electrodes for alternating and direct current. Ampco Metal Inc., 1745 S. 38th St., Milwaukee 46, Wis.

Axle Assemblies

Features of two and four-wheel axle assemblies for mobile equipment are presented in a 4-page bulletin. United Mfg. Co., 3637 W. 56th St., Cleveland 2, O.

NEW BOOKS

ASTM Standards on Light Metals and Alloys, Cast and Wrought, American Society for Testing Materials, 1916 Race St., Philadelphia 3, Pa., 276 pages, $3.50.

Aluminum, magnesium and their alloys are covered. Standards include those for ingots, castings, bars, rods, wires, forgings, pipes and tubes, sheets and plates, wrought products (for electrical purposes), filler metal, electroplating and testing methods.

Symposium on Basic Effects of Environment on the Strength, Scaling and Embrittlement of Metals at High Temperatures, American Society for Testing Materials, 1916 Race St., Philadelphia 3, Pa., 120 pages, $2.75.

These papers on high temperature alloys present data on oxidation, surface effects and creep under controlled atmospheres.

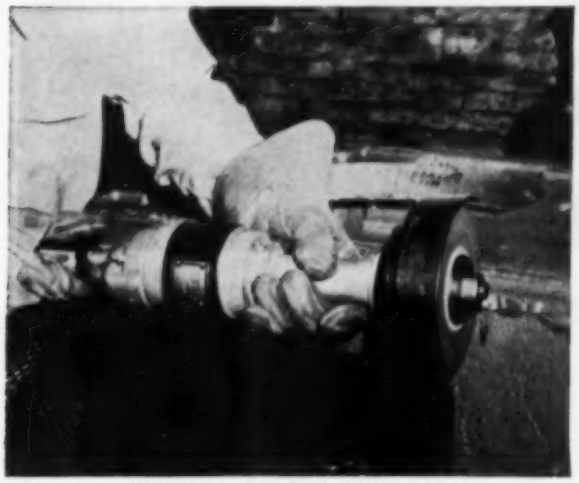
Mechanical Properties of Wrought Phosphor-Bronze Alloys, G. R. Gohn Jr., P. Guerard, H. S. Freynik, American Society for Testing Materials, 1916 Race St., Philadelphia 3, Pa., 120 pages, $3.

Nearly 100 pages of diagrams show the effect of cold working on the mechanical properties of a series of eight phosphor-bronze alloys—cold-rolled strip, with a tin content of 0.5 to 10 per cent.

Gardner-Denver . . . Serving the World's Basic Industries

DOWN SHE GOES. Powerful G-D sheeting driver gets the job done—fast.

BREAK IT UP. That's an order for this G-D team—paving breaker and portable.



GRINDING OUT THE WORK. It's a cinch with a husky Keller Tool air grinder.

DRILLING THE HOLE. Nothing to it with a G-D utility drill and air compressor.

You repair the job . . . not the tool when you choose Gardner-Denver

Many of the world's industries rely on Gardner-Denver air tools for plant maintenance work where time and cost are important factors.

Write for descriptive literature.

Other Gardner-Denver maintenance tools:

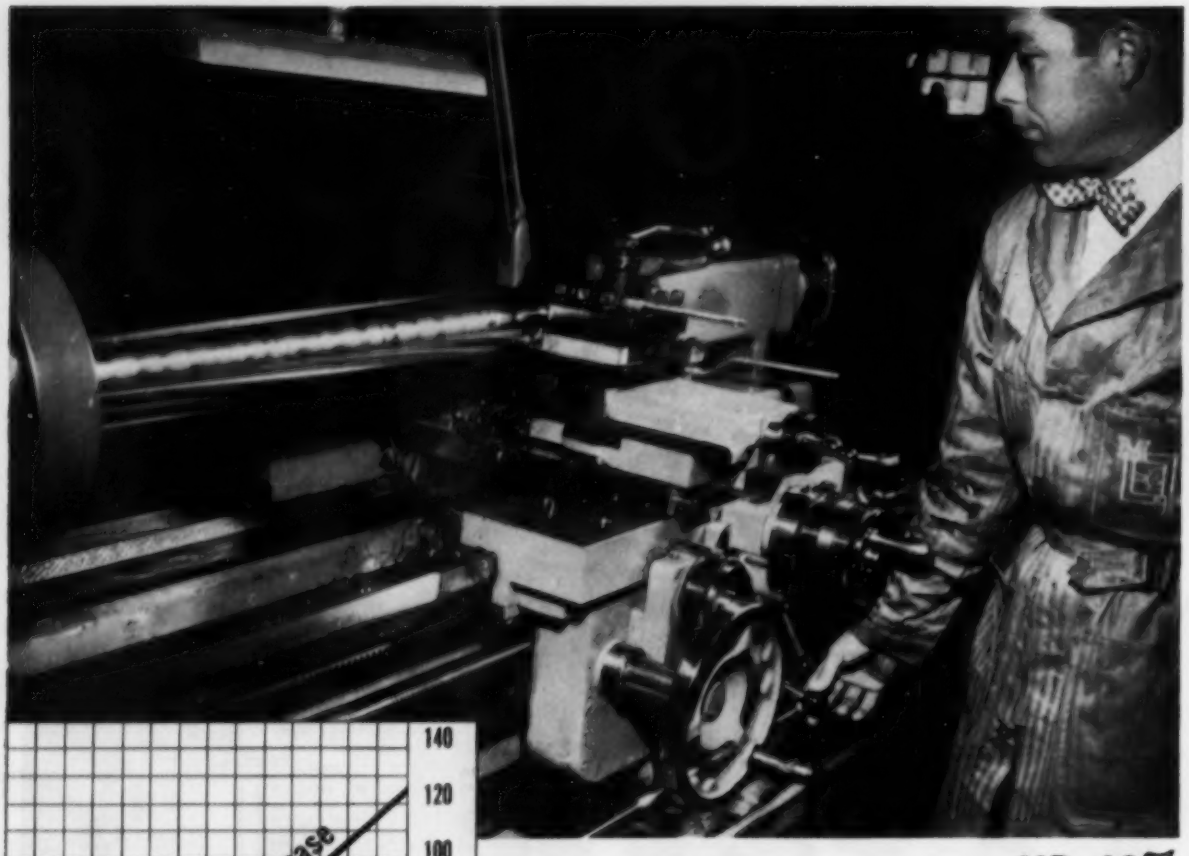
Tampers	Air Hoists
Trench Diggers	Impact Wrenches
Clay Spaders	Sanders and Chippers
Sump Pumps	Air Line Lubricators

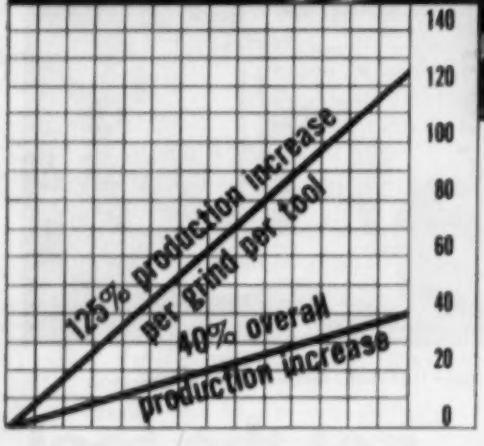
GARDNER - DENVER

THE QUALITY LEADER IN COMPRESSORS, PUMPS, ROCK DRILLS AND AIR TOOLS FOR CONSTRUCTION, MINING, PETROLEUM AND GENERAL INDUSTRY

Gardner-Denver Company, Quincy, Illinois

In Canada: Gardner-Denver Company (Canada), Ltd., 14 Curity Avenue, Toronto 16, Ontario





Lathe Shaft production *UP 40%* with new Firthite TXH Carbide

Wherever used, *new* FIRTHITE TXH Carbide is proving its competitive superiority . . . as at Boyé & Emmes Machine Tool Company, Cincinnati, for turning lathe shafts from 3 inch SAE 4140 un-annealed steel.

Here's what they found:

- Overall production went up 40%.
- Production increase of 125% per grind per tool.
- Twelve shafts per tool without regrinding.
- Only .0010 flank wear in 12 cuts.

Impressive? You bet! So much so that many tool engineers have acclaimed TXH as the most nearly "universal" grade of carbide yet developed. That's because TXH is an entirely new concept in carbide metallurgy . . . a combination of materials and processes designed specifically to do heavy-duty, high-production cutting operations better than they have ever been done before. And while a distinctly *premium grade,* TXH is not *premium priced!*

You try it. It's available from stock in all standard tips, tools and inserts.

TXH ADVANTAGES

- Higher hardness to strength ratio
- Improved impact resistance
- Wider range of applications
- Lower operating temperatures
- Higher edge strength
- Greater resistance to abrasion

M-317

Firth Sterling

—INC—

GENERAL OFFICES: 3113 FORBES ST., PITTSBURGH 30, PA.

MILLS: McKEESPORT, TRAFFORD, DETROIT, HOUSTON

OFFICES AND WAREHOUSES*: BIRMINGHAM CHICAGO* CLEVELAND* DAYTON DETROIT* HARTFORD* HOUSTON LOS ANGELES* PITTSBURGH WESTFIELD, N. J.

PRODUCTS OF FIRTH STERLING METALLURGY

High Speed Steels
Tool & Die Steels
Stainless Specialties
High Temperature Alloys
Sintered Tungsten Carbides
Firth Heavy Metal
Chromium Carbides
High Temperature Cermets
Zirconium

STEEL

July 9, 1956

Market Outlook

FIRST to feel effects of the steelworkers' strike will be the users of structural shapes and heavy plates.

BILLION-DOLLAR MARKETS—The large volume of construction and output of heavy equipment have pulled strongly upon supplies. New construction put into place reached a record total of nearly $15.8 billion in the first five months of this year, and outlays for new construction this year are expected to be $44.5 billion—3.5 per cent above last year's record $43 billion. Indicative of the steel needs of heavy equipment are production and new order figures for machinery. Production in the first four months of this year was valued at $14.7 billion, up 16 per cent over the corresponding period of last year. New orders in the first four months of 1956 totaled $15.6 billion, 22.5 per cent above the comparable months of 1955.

WORST TO COME—Even an early settlement of the strike won't prevent a further pinch on structurals and plates. Some users of these two products are on a hand-to-mouth supply. This pinch persists even though reduced demand for light, flat-rolled steel (particularly cold-rolled carbon sheets) has permitted an increased flow of ingots into structurals and heavy plates. Mill shipments of heavy structurals in the first four months of this year totaled 1,846,961 net tons, a 25 per cent rise over the comparable period of last year, while mill shipments of plates rose 35.5 per cent.

COSTLY SUBSTITUTE—The structural steel shortage has been so acute that some fabricators have been taking European steel, the price of which is around 60 per cent above that of domestic structurals. American users of European plates have to pay around 90 per cent more for them than they do for the American product.

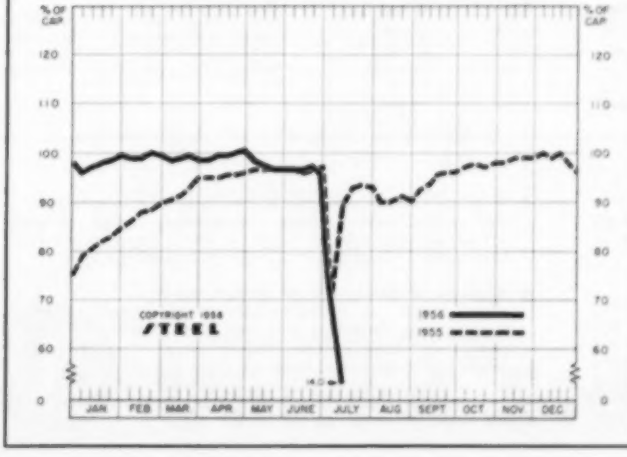
Except for structurals and heavy plates and a few other products, inventories of steel are higher than they have been since mid-1953, when an inventory reduction set in.

LUCKY FELLOWS—Small consumers still have their source of supply—the warehouses. Robert G. Welch, executive secretary of the American Steel Warehouse Association, Cleveland, estimated warehouses had a three-month supply of steel, based on the pre-strike rate of sales.

PRODUCTION TRICKLE—The strike did not shut off steel production entirely. A few producers are not under contracts with the United Steelworkers, a few producers' contracts do not expire now, and some producers under United Steelworkers' contracts have been given extensions. In the week ended July 8, production of steel for ingots and castings was at a national average of 14 per cent of capacity.

PRICE TRENDS—Companies that were operating were looking toward protecting themselves on retroactive wage increases by raising prices. Copperweld Steel Co. raised prices $10 a ton. A southern producer of merchant pig iron raised its price $4 a gross ton on July 2. Its new price on No. 2 foundry iron is $59 a gross ton. The producer, United States Pipe & Foundry Co., Birmingham, did not raise its price a few months ago when producers, except those in the South, went up $1.50 a ton.

NATIONAL STEELWORKS OPERATIONS



DISTRICT INGOT RATES

(Percentage of Capacity Engaged)

	Week Ended July 8	Change	Same Week 1955	Same Week 1954
Pittsburgh	2.5	— 90*	91	58.5
Chicago	6.5	— 75.5*	92	70.5
Mid-Atlantic	9	— 66*	89	55
Youngstown	0	—100	98	60
Wheeling	56	— 37	95	65
Cleveland	0	— 88.5*	94	56.5
Buffalo	0	—105	100	61
Birmingham	2.5	— 21	93.5	76
New England	10	— 76	73	48
Cincinnati	69.5	— 20.5	54.5	62
St. Louis	93.5	— 1	98.5	55.5
Detroit	15.5	— 89.5	95	50
Western	33	— 72	101	86
National Rate	14	— 60*	89.5	59.5

INGOT PRODUCTION‡

	Week Ended July 8	Week Ago	Month Ago	Year Ago
INDEX (1947-1949=100)	19.9	130.1	148.2	129.9
NET TONS (In thousands)	320	2,099	2,380	2,073

*Change from preceding week's revised rate †Estimated. ‡Amer. Iron & Steel Institute Weekly capacity (net tons): 2,461,893 in 1956; 2,413,278 in 1955; 2,384,549 in 1954

Metalworking Outlook—p. 47 Technical Outlook—p. 85

Price Indexes and Composites

FINISHED STEEL PRICE INDEX (Bureau of Labor Statistics)

	July 3 1956	June 26 1956	Month Ago	June Average
(1947-1949=100)	158.2	158.2	158.2	158.2

AVERAGE PRICES OF STEEL (Bureau of Labor Statistics)

Week Ended July 3

Prices include mill base prices and typical extras and deductions. Units are 100 lb except where otherwise noted in parentheses. For complete description of the following products and extras and deductions applicable to them, write to STEEL.

Rails, Standard No. 1	$4.800	Sheets, Electrical	$10.175
Rails, Light, 40 lb	6.217	Strip, C.R., Carbon	8.243
Tie Plates	5.625	Strip, C.R., Stainless, 403 (lb)	0.444
Axles, Railway	9.350	Strip, H.R., Carbon	5.606
Wheels, Freight Car, 33 in. (per wheel)	52.50	Pipe, Black, Buttweld (100 ft)	16.997
Plates, Carbon	5.200	Pipe, Galv., Buttweld (100 ft)	21.137
Structural Shapes	4.867	Pipe, Line (100 ft)	170.038
Bars, Tool Steel, Carbon (lb)	0.460	Casing, Oil Well, Carbon (100 ft)	165.120
Bars, Tool Steel Alloy, Oil Hardening Die (lb)	0.560	Casing, Oil Well, Alloy (100 ft)	256.030
Bars, Tool Steel, H. R. Alloy, High Speed W 6.75, Cr 4.5, V 2.1, Mo 5.5, C 0.60 (lb)	1.185	Tubes, Boiler (100 ft)	41.530
Bars, Tool Steel, H.R., Alloy, High Speed W 18, Cr 4, V 1 (lb)	1.650	Tubing, Mechanical, Carbon (100 ft)	21.360
Bars, H.R., Alloy	9.475	Tubing, Mechanical Stainless, 304 (100 ft)	178.897
Bars, H.R., Stainless, 303 (lb)	0.450	Tin plate, Hot-dipped, 1.25 lb	9.233
Bars, H.R., Carbon	5.500	Tin Plate, Electrolytic, 0.25 lb	8.033
Bars, Reinforcing	5.313	Black Plate, Canmaking Quality	7.133
Bars, C.F., Carbon	9.000	Wire, Drawn, Carbon	8.575
Bars, C.F., Alloy	12.375	Wire, Drawn, Stainless, 430 (lb)	0.500
Bars, C.F., Stainless, 302 (lb)	0.475	Bale ties (bundle)	6.537
Sheets, H.R., Carbon	5.345	Nails, Wire, 8d Common	8.595
Sheets, C.R., Carbon	6.214	Wire, Barbed (80-rod spool)	7.847
Sheets, Galvanized	7.770	Woven Wire Fence (20-rod roll)	18.635
Sheets, C.R., Stainless, 302 (lb)	0.590		

STEEL's FINISHED STEEL PRICE INDEX*

	July 3 1956	Week Ago	Month Ago	Year Ago	5 Yrs. Ago
Index (1935-39 av.=100)	210.45	210.45	210.45	207.63	171.92
Index in cents per lb	5.701	5.701	5.701	5.625	4.657

STEEL's ARITHMETICAL PRICE COMPOSITES

Finished Steel, NT*	$129.18	$128.98	$128.98	$126.64	$106.32
No. 2 Fdry Pig Iron, GT	60.56	60.27	60.27	56.54	52.54
Basic Pig Iron, GT	59.80	59.80	59.80	56.04	52.16
Malleable Pig Iron, GT	61.27	61.27	61.27	57.27	53.27
Steelmaking Scrap, GT	45.83	46.00	46.17	37.83	44.00

*For explanation of weighted index see STEEL, Sept. 19, 1949, p. 54; of arithmetical price composites STEEL, Sept. 1, 1952, p. 130.

Comparison of Prices

Comparative prices by districts, in cents per pound except as otherwise noted. Delivered prices based on nearest production point.

FINISHED STEEL	July 3 1956	Week Ago	Month Ago	Year Ago	5 Yrs. Ago
Bars, H.R., Pittsburgh	4.65	4.65	4.65	4.65	3.70
Bars, H.R., Chicago	4.65	4.65	4.65	4.65	3.70
Bars, H.R., deld. Philadelphia	4.93	4.93	4.93	4.90	4.20
Bars, C.F., Pittsburgh	6.25*	6.25*	6.25*	5.90	4.55
Shapes, Std., Pittsburgh	4.60	4.60	4.60	4.60	3.65
Shapes, Std., Chicago	4.60	4.60	4.60	4.60	3.65
Shapes, deld., Philadelphia	5.00	5.00	5.00	4.88	3.91
Plates, Pittsburgh	4.50	4.50	4.50	4.50	3.70
Plates, Chicago	4.50	4.50	4.50	4.50	3.70
Plates, Coatesville, Pa.	4.80	4.80	4.80	4.50	4.15
Plates, Sparrows Point, Md.	4.50	4.50	4.50	4.50	3.70
Plates, Claymont, Del.	5.35	5.35	5.35	4.50	4.15
Sheets, H.R., Pittsburgh	4.325	4.325	4.325	4.325	3.60-3.75
Sheets, H.R., Chicago	4.325	4.325	4.325	4.325	3.60
Sheets, C.R., Pittsburgh	5.325	5.325	5.325	4.325	4.35
Sheets, C.R., Chicago	5.325	5.325	5.325	4.325	4.35
Sheets, C.R. Detroit	5.325-5.425	5.325-5.425	5.325-5.425	5.325-5.425	4.55
Sheets, Galv., Pittsburgh	5.85	5.85	5.85	5.85	4.60
Strip, H.R., Pittsburgh	4.325	4.325	4.325	4.325	3.75-4.00
Strip, H.R., Chicago	4.325	4.325	4.325	4.325	3.50
Strip, C.R., Pittsburgh	6.25	6.25	6.25	6.317	4.65-5.35
Strip, C.R., Chicago	6.25-6.35	6.25-6.35	6.25-6.35	6.35-6.45	4.90
Strip, C.R., Detroit	6.35	6.35	6.35	6.35	4.35-5.00
Wire, Basic, Pittsburgh	6.60	6.60	6.60	6.25	4.85-5.10
Nails, Wire, Pittsburgh	7.60	7.60	7.60	7.65	5.90-6.20
Tin plate (1.50 lb), box, Pitts.	$9.85	$9.85	$9.85	$9.05	$8.70

*Including 0.35c for special quality

SEMIFINISHED STEEL					
Billets, forging, Pitts. (NT)	$84.50	$84.50	$84.50	$84.50	$66.00
Wire rods, ⅜-⅝" Pitts.	5.375	5.375	5.375	5.025	4.10-4.30

PIG IRON, Gross Ton					
Bessemer, Pitts.	$61.00	$61.00	$61.00	$57.00	$53.00
Basic, Valley	60.00	60.00	60.00	56.00	52.00
Basic, deld. Phila.	63.76	63.76	63.76	59.66	56.49
No. 2 Fdry, Pitts.	60.50	60.50	60.50	56.50	52.50
No. 2 Fdry, Chicago	60.50	60.50	60.50	56.50	52.50
No. 2 Fdry, deld. Phila.	64.26	64.26	64.26	55.16	56.99
No. 2 Fdry, Birm.	57.00	55.00	55.00	52.88	48.88
No. 2 Fdry (Birm.) deld. Cin.	62.70	62.70	62.70	60.58	55.33
Malleable, Valley	60.50	60.50	60.50	56.50	52.50
Malleable, Chicago	60.50	60.50	60.50	56.50	52.50
Ferromanganese, Duquesne	215.00†	215.00†	215.00†	190.00†	188.00*

†74-76% Mn, net ton. *75-82% Mn, gross ton, Etna, Pa.

SCRAP, Gross Ton (Including broker's commission)					
No. 1 Heavy Melt, Pittsburgh	$44.50	$44.50	$44.50	$38.50	$45.00
No. 1 Heavy Melt, E. Pa.	47.00	47.50	48.00	39.00	43.50
No. 1 Heavy Melt, Chicago	46.00	46.00	46.00	36.00	43.50
No. 1 Heavy Melt, Valley	44.50	44.50	49.50	37.50	45.00
No. 1 Heavy Melt, Cleve.	42.50	42.50	47.50	35.00	44.00
No. 1 Heavy Melt, Buffalo	42.50	42.50	45.50	29.50	44.00
Rails, Rerolling, Chicago	66.50	66.50	69.50	55.50	52.50
No 1 cast, Chicago	45.50	45.50	45.50	43.50	49.00

COKE, Net Ton					
Beehive, Furn, Connlsvl.	$14.125	$14.125	$14.125	$13.75	$14.75
Beehive, Fdry, Connlsvl.	16.50	16.50	16.50	16.75	17.50
Oven, Fdry, Chicago	27.00	27.00	27.00	24.50	21.00

Daily Nonferrous Price Record

	July 3 Price	Last Change	Previous Price	June Avg.	May Avg.	July 1955 Avg.
Copper	40.00-46.00	May 29, 1956	43.00-46.00	43.000	45.096	36.000
Lead	15.80	Jan. 13, 1956	16.30	15.800	15.800	14.800
Zinc	13.50	Jan. 6, 1956	13.00	13.500	13.500	12.280
Tin	92.875	June 29, 1956	94.75	94.611	97.024	97.045
Nickel	64.50	Nov. 24, 1954	60.00	64.500	64.500	64.500
Aluminum	25.90	Mar. 29, 1956	24.40-25.90	25.900	25.900	23.200
Magnesium	33.75	Apr. 16, 1956	32.50	33.750	33.750	28.500

Quotations in cents per pound based on: COPPER, deld. Conn. Valley; LEAD, common grade, deld. St. Louis; ZINC, prime western, E. St. Louis; TIN, Straits, deld. New York; NICKEL, electrolytic cathodes, 99.9%, base size at refinery, unpacked; ALUMINUM, primary ingots, 99 + %, deld.; MAGNESIUM, pig, 99.8%, Velasco, Tex.

What You Can Use the Market Section for:

- **A source of price information.** Current prices are reported each week. Price changes are shown in italics. Price trends are shown in tables of indexes and comparisons.
- **A directory of producing points.** Want to know who makes something, or where it is made? The steel price tables alphabetically list the cities of production and indicate the producing company. If you are a buyer, you may want to make a map showing comparative distances of sources of supply and to help you compute freight costs. If you are a seller of supplies you can make a map to spot your sales possibilities.
- **A source of price data for making your own comparisons.** Maybe you want to keep a continuous record of price spread between various forms of steel. You can get your base price information from STEEL's price tables.
- **A source of information on market trends.** Newsy items tell you about the supply-demand situation of materials, including iron and steel, nonferrous metals and scrap. Other articles analyze special situations of interest and importance to you.
- **Reports on iron and steel production, and materials and product shipments.**

These huge tank sections are
protected against acid attack by
U. S. Permobond. Their shipment from
maker to "U. S." plant to customer
was handled by "U. S."

The expansion plans of a chemical plant called for the design of a processing tank that was so huge it could not be shipped in one piece.

So the steel fabricator's engineers, working with "U. S." engineers, designed the tank in 2 parts. The tricky task of transporting these immense sections from the fabricator to the "U. S." plant (where U. S. Permobond protective linings were installed) and from there to the chemical plant was *arranged* by "U. S." traffic specialists. When the 2 sections arrived at the chemical plant, "U. S." field service men vulcanized the joints after the halves were welded together, making a complete rubber lining with no seams or joints. Thanks to the Permobond® lining, the tank is immune to acid attack.

For protection against corrosion of tanks, piping, valves—get in touch with us at Rockefeller Center, New York 20, N. Y.

Mechanical Goods Division

United States Rubber

Nonferrous Metals

An announcement by Britain that copper will be released from stockpile sent London Metal Exchange quotations plummeting toward the 30 cent a pound mark

Nonferrous Metal Prices, Pages 130 & 131

THE LONDON Metal Exchange copper quotation dropped to 33.11 cents per pound on July 2. Reason: The British government leaked an announcement that it would release 6000 tons of stockpiled copper (to be sold on the open market) each month for the next six.

According to official British sources, the first offering would be made about Aug. 1. It is felt by copper experts that the U. K. may be attempting to force the market back to its more normal price of 30 cents a pound.

Reaction—Copper users are smiling. This may be the big break, with the decline of domestic prices to below the 40 cent a pound level as the eventual outcome. At this writing, primary domestic producers are maintaining the 46 cent a pound quotation; custom smelters, 40 cents.

Brass mills continue to exert pressure on U. S. producers to lower prices. Although it is unlikely, some mills are threatening to buy foreign copper.

Outlook—Primary red metal prices could fall below the 40 cent a pound mark before July 15. If Britain puts 6000 tons of copper on the market each month during the second half, look for 36 cent (possibly 30 cent) copper by the fourth quarter.

Lead, Zinc Sales Slow

Lead sales are far from spectacular, but they will not suffer severe cutbacks because of the steel strike. Battery makers are buying normal tonnages, and gasoline refiners will help keep the sales level moderately high.

While the appropriations for buying lead and zinc for the government's stockpile have run out, there is every reason to believe that the General Services Administration will continue to enter the market for both metals.

Zinc sales, due to the breakdown in steel talks, have come to a virtual standstill. Some bookings, which were subject to a no-strike clause in the steel industry, will be delayed until steel production returns to normal.

One bright spot: Some customers (diecasters) who have skipped buying any zinc for the last two months are about to re-enter the market. Barring a long steel strike, zinc sales could make a strong recovery during August.

Nickel: Rumor of Week

Rumors are spreading that some nickel producers are going to increase prices. Sherritt Gordon Mines Ltd. continues to be the leading advocate. Sherritt Gordon has pointed out in the past that it does not have copper deposits to help bring in additional revenue.

Look for International Nickel Co. to hold the price line as long as possible. A dual price might become the order of the day as smaller producers band together to bring about hikes.

STEEL's Metal Price Averages for June, 1956

(Cents per lb)

Electrolytic Copper, deld. Connecticut	43.000
Lead, St. Louis	15.800
Prime Western Zinc, E. St. Louis, Ill.	13.500
Straits Tin, New York	94.611
Primary Aluminum Ingots, deld.	25.900
Magnesium, Velasco, Tex.	33.750
Nickel, f.o.b. refinery	64.500

Aluminum: New Market?

Dr. George Perkins, product development director, Reynolds Metals Co., reports: "Several of the nation's leading automobile manufacturers have expressed great interest in the use of aluminum strip conductor for generator, horn, ignition, starter, solenoid and starter motor coils. Costwise, the lower base price of aluminum makes possible savings up to 50 per cent in conductor costs . . ."

Meanwhile, aluminum contract talks are getting under way. Union efforts (United Steelworkers) center on the Aluminum Co. of America. Most observers believe there will be no serious talks until a definite trend comes out of the steel industry. Historically, the aluminum industry grants about the same type wage package as steel.

Tin and Autos

Tin men are becoming increasingly interested over the prospect of using electrolytically deposited tin on automotive sheet. Says a tin expert: "If automotive grade steel were coated with as little as a half a millionth of a meter of electrodeposited tin, the life of this steel could be prolonged many times."

Another tin advocate says: "The principle of tinning before painting is slowly being adopted by the motor car industry . . ." Auto makers are denying (at the moment) that they have any plans for the use of tin coated sheets, but when Detroit denies a rumor emphatically, it is often the forerunner of an announcement.

Titanium Prices Drop

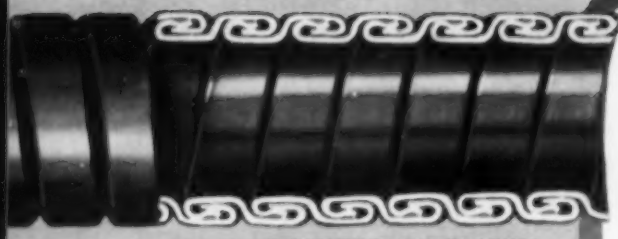
Du Pont stole the price reduction spotlight last week by announcing a 25 cent a pound decrease on titanium sponge. According to F. H. Weismuller, general manager, pigment department, the current drop to $3 a pound for sponge has been made possible by the improvement in alloy fabricating techniques which, in turn, have made demands for the metal skyrocket. Says Mr. Weismuller: "Lower sponge prices are a reflection of this demand."

Du Pont is spending some $1 million a year to find new and improved processes for manufacturing the metal. The price of titanium sponge has dropped 40 per cent (from $5 a pound) in a little over two years. It is anticipated that the other primary producers will follow this lead and establish an industry base price of $3 a pound for grade A-1 titanium sponge.

Market Memos

- Alcoa will commence construction of additional smelting facilities at its Massena, N. Y., works in the near future.
- Kaiser Aluminum & Chemical Corp. reports that net earnings for its fiscal year ended May 31 were $43.3 million. This compares with net earnings of $28.6 million for fiscal '55. Included in this year's totals are favorable nonrecurring income adjustments of $2.6 million.

TYPE FP WIRE BRAIDED



HEAVY DUTY INTERLOCKED

LIGHTWEIGHT SQUARELOCKED
Unpacked, cord packed, light asbestos packed, heavy asbestos packed

TWIN-LOK
Galvanized Lined
Stainless Steel Lined

FLEXIBILITY

DEFIES HEAT...FATIGUE ABRASION...LEAKAGE

Penflex is ruggedly built hose with all of the flexibility required, plus the toughness and durability of metal. No matter how hot the material to be conveyed Penflex cannot be cooked like ordinary hose. It stubbornly defies rough abuse, abrasion and crushing.

From 1/8" I.D. to 24" I.D. . . . bronze, galvanized steel, or stainless steel . . . from an air compressor line to a diesel exhaust, Penflex makes them all for the steel industry. And Penflex "Flexineering"—the science of applying flexible tubing to fit the particular needs of the job to be done—assures the right tube in each installation. When you require tubing or hose that is tight as a pipe, but flexible . . . safe at high temperatures . . . and free from metal fatigue, specify Penflex.

Penflex manufactures a complete line of four wall interlocked and seamless welded corrugated flexible tubing for the steel industry. Write for your free copy of the booklet "Flexineering At Work."

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HEART OF INDUSTRYS LIFELINES

PENFLEX

METALLIC TUBING

Nonferrous Metals

Cents per pound, carlots, except as otherwise noted

PRIMARY METALS AND ALLOYS

Aluminum: 99 + %, ingots, 25.90; pigs, 24.00, 10,000 lb or more, f.o.b. shipping point. Freight allowed on 500 lb or more.

Aluminum Alloy: No. 13, 12% Si, 27.70; No. 43, 5% Si, 27.50; No. 132, 4% Cu, 1.5% Mg, 2% Ni, 29.70; No. 195, 4.5% Cu, 0.8% Si, 29.30; No. 214, 3.8% Mg, 29.30; No. 356, 7% Si, 0.3% Mg, 27.70.

Antimony: R.M.M. brand, 99.5%, 33.00; Lone Star brand, 33.50, f.o.b. Laredo, Tex., in bulk. Foreign brands, 99.5%, 27.00-28.00, New York, duty paid, 10,000 lb or more.

Beryllium: 97%, lump or beads, $71.50 per lb, f.o.b. Cleveland or Reading, Pa.

Beryllium Aluminum: 5% Be, $74.75 per lb of contained Be, f.o.b. Reading, Pa., Elmore, O.

Beryllium Copper: 3.75-4.25% Be, $43 per lb of contained Be, with balance as Cu at market price on shipment date, f.o.b. Reading, Pa., or Elmore, O.

Bismuth: $2.25 per lb ton lots.

Cadmium: Sticks and bars, $1.70 per lb deld.

Cobalt: 97-99%, $2.60 per lb for 550-lb keg; $2.62 per lb for 100-lb case; $2.67 per lb under 100 lb.

Columbium: Powder, $119.20 per lb, nom.

Copper: Electrolytic, 46.00 deld. Conn. valley; 46.00 deld. Midwest; custom smelters, 40.00 deld.; lake, 46.00 deld.; fire refined, 45.75 deld.

Germanium: First reduction, $201.85-$220 per lb; intrinsic grade, $220-$242.67 per lb, depending on quantity.

Gold: U. S. Treasury, $35 per oz.

Indium: 99.9%, $2.25 per troy oz.

Iridium: $100-$110 nom. per troy oz.

Lead: Common, 15.80; chemical, 15.90; corroding, 15.90, St. Louis. New York basis, add 0.20.

Lithium: 99 +, cups or ingots, $11.50; rod $13.50; shot or wire, $14.50, f.o.b. Minneapolis, 100 lb lots.

Magnesium: Pig, 33.75 f.o.b. Velasco, Tex.; ingot, 34.50 f.o.b. Velasco, Tex.

Magnesium Alloys: AZ91B (diecasting), 35.00 deld.; AZ63A, AZ92A, AZ91C (sand casting), 39.25 f.o.b. Velasco, Tex.

Mercury: Open market, spot, New York, $250-$259 per 76-lb flask.

Molybdenum: Powder, 99% hydrogen reduced, $3.20 per lb; pressed ingot, $4.06 per lb; sintered ingot, $5.53 per lb.

Nickel: Electrolytic cathodes, sheets (4 x 4 in. and larger), unpacked, 64.50; 10-lb pigs, unpacked, 67.65; "XX" nickel shot, 69.00; "F" nickel shot or ingots for addition to cast iron, 64.50; prices f.o.b. Port Colborne, Ont., including import duty. New York basis, add 0.92.

Osmium: $80-$100 per troy oz, nom.

Palladium: $23-$24 per troy oz.

Platinum: $103-$110 per troy oz from refineries.

Radium: $16-$21.50 per mg radium content, depending on quantity.

Rhodium: $118-$125 per troy oz.

Ruthenium: $45-$55 per troy oz.

Selenium: 99.5%, $13.50-$15.50 per lb.

Silver: Open market, 90.25 per troy oz.

Sodium: 16.50, c.l.; 17.00, l.c.l.

Tantalum: Sheet, rod, $68.70 per lb; powder, $56.63 per lb.

Tellurium: $1.50-$1.75 per lb.

Thallium: $12.50 per lb.

Tin: Straits, N. Y., spot and prompt, 92.875.

Titanium: Sponge, 99.3 + %, grade A-1 ductile (0.3% Fe max), $3.00; grade A-2 (0.5% Fe max), $2.70 per pound.

Tungsten: Powder, 98.8%, carbon reduced, 1000-lb lots, $4.50 per lb, nom, f.o.b. shipping point; less than 1000 lb add 15.00; 99 + % hydrogen reduced, $5.00. Treated ingot, $6.70.

Zinc: Prime Western, 13.50; brass special, 13.75; intermediate, 14.00, East St. Louis, freight allowed over 0.50 per pound. High grade, 14.85; special high grade, 15.25 deld. Diecasting alloy ingot No. 3, 18.00; No. 2, 19.00; No. 5, 18.50, deld.

Zirconium: Ingots, commercial grade, $14.40 per lb; low-hafnium reactor grade, $23.07. Sponge, commercial grade, $7.50-$10.00 per lb, depending on quantity; reactor grade, $14.00-$22.00 per lb, depending on quantity. Powder, electronics grade, $15 per lb; flash grade, $11.50.

(Note: Chromium, manganese and silicon metals are listed in ferroalloy section.)

SECONDARY METALS AND ALLOYS

Aluminum Ingot: Piston alloys, 26.00-28.25; No. 12 foundry alloy (No. 2 grade), 24.25-25.00; 5% silicon alloy, 0.60 Cu max, 25.75-26.50; 13 alloy, 0.60 Cu max, 25.75-26.50; 195 alloy, 26.25-27.00; 108 alloy, 24.75-25.00. Steel deoxidizing grades, notch bars, granulated or shot: Grade 1, 25.00; grade 2, 24.25; grade 3, 23.50; grade 4, 22.00.

Brass Ingot: Red brass, No. 115, 35.50; tin bronze, No. 225, 48.00; No. 245, 41.50; high-leaded tin bronze, No. 305, 38.75; No. 1 yellow No. 405, 30.75; manganese bronze, No. 421, 31.25.

Magnesium Alloy Ingot: AZ63A, 36.00; AZ91B, 36.00; AZ91C, 36.00; AZ92A, 36.00.

NONFERROUS PRODUCTS

BERYLLIUM COPPER

(Base prices per lb, plus mill extras, 2000 to 5000 lb, f.o.b. Temple, Pa.; nominal 1.9% Be alloy) Strip, $1.92; rod, bar, wire, $1.89.

COPPER WIRE

Bare, soft, f.o.b. eastern mills, 30,000-lb lots, 51.35¢; l.c.l., 51.98. Weatherproof, 30,000-lb lots, 48.28; l.c.l., 49.03. Magnet wire deld., 15,000 lb or more, $58.68; l.c.l., 59.43.

LEAD

(Prices to jobbers, f.o.b. Buffalo, Cleveland, Pittsburgh) Sheets, full rolls, 140 sq ft or more, $21.50 per cwt; pipe, full coils, $21.50 per cwt; traps and bends, list prices plus 30%.

TITANIUM

(Prices per lb, 10,000 lb and over, f.o.b. mill) Sheets, $12.60-$13.10; sheared mill plate, $10.00-$12.00; strip, $12.10-$12.60; wire, $9.00-$11.50; forging billets, $7.25-$7.50; hot-rolled and forged bars, $7.50-$7.80.

ZINC

(Prices per lb, c.l., f.o.b. mill) Sheets, 24.00; ribbon zinc in coils, 21.50; plates, 20.00.

ZIRCONIUM

Plate, $22; H.R. strip, $19; C.R. strip, $29; forged or H.R. bars, $17; wire, 0.015 in., 1.00c per linear foot.

NICKEL, MONEL, INCONEL

	"A" Nickel	Monel	Inconel
Sheets, C.R.	102	83	99
Strip, C.R.	102	92	125
Plate, H.R.	97	87	95
Rod, Shapes, H.R.	87	74	93
Seamless Tubes	122	110	153

ALUMINUM

Screw Machine Stock: 30,000 lb base.

Diam. (in.) or across flats	Round 2011-T3	Round 2017-T4	Hexagonal 2011-T3	Hexagonal 2017-T4
Drawn				
0.125	60.4	67.9	...	...
0.156-0.172	59.0	57.4	...	...
0.188	59.0	57.4	...	73.2
0.219-0.234	56.0	54.4	...	...
0.250-0.281	56.0	54.4	...	69.9
0.313	56.0	54.4	...	66.7
Cold-finished				
0.375-0.547	54.9	52.9	65.2	62.8
0.563-0.688	54.9	52.9	62.1	59.0
0.750-1.000	53.6	51.6	56.9	55.7
1.063	53.6	51.6	...	53.8
1.125-1.500	51.6	49.7	55.1	53.8
Rolled				
1.563	50.3	48.4	...	...
1.625-2.000	49.7	47.7	...	52.0
2.125-2.500	48.5	46.5	...	...
2.563-3.375	47.1	45.1	...	...

ALUMINUM

Sheets and Circles: 1100 and 3003 mill finish (30,000 lb base; freight allowed)

Thickness Range Inches	Flat Sheet	Flat Sheet Circles*	Coiled Sheet	Coiled Sheet Circles†
0.249-0.126	39.0	43.8	...	...
0.125-0.096	39.5	44.7	37.5	42.4
0.095-0.077	40.2	45.7	37.6	42.8
0.076-0.061	40.8	46.6	37.8	43.0
0.060-0.048	41.4	47.1	38.2	43.5
0.047-0.038	41.9	48.0	38.7	43.9
0.037-0.030	42.3	48.5	39.1	44.6
0.029-0.024	42.9	49.0	39.4	45.1
0.023-0.019	43.7	50.5	40.3	46.0
0.018-0.017	44.5	...	40.9	46.9
0.016-0.015	45.4	...	41.7	48.1
0.014	46.4	...	42.7	49.4
0.013-0.012	47.6	...	43.4	50.4
0.011	48.6	...	44.6	52.0
0.010-0.0095	49.9	...	45.8	53.7
0.009-0.0085	51.2	...	47.3	55.8
0.008-0.0075	52.8	...	48.5	57.6
0.007	54.3	...	50.0	59.9
0.006	55.9	...	51.4	64.9

*48 in. max diam. †36 in. max diam.

ALUMINUM

Plates and Circles: Thickness 0.250-3 in., 24-60 in. width or diam, 72-240 in. lengths.

Alloy	Plate Base	Circle Base
1100-F, 3003-F	38.0	42.3
5050-F	39.1	43.4
3004-F	40.1	45.3
5052-F	41.4	46.7
6061-T6	42.6	47.5
2024-T4*	45.1	51.4
7075-T6*	52.9	60.0

*24-48 in. widths or diam, 72-180 lengths.

ALUMINUM

Forging Stock: Round, Class 1, 40.60-51.60 in specific lengths 36-144 in. diameters 0.375-8 in. Rectangles and squares, Class 1, 44.50-57.70 in random lengths, 0.375-4 in. thick, width 0.750-10 in.

Pipe: ASA schedule 40, alloy 6063-T6, 20-ft length, plain ends, 90,000-lb base, per 100 ft.

Nom. Pipe Size (in.)		Nom. Pipe Size (in.)	
¾	$17.45	2	$ 53.85
1	27.35	4	148.60
1¼	37.05	6	286.55
1½	44.30	8	401.10

MAGNESIUM

Sheet and Plate: AZ31A standard grade, .032 in., 100.00; .081 in., 75.00; .188 in., 66.50; .250-2.0 in., 65.60. AZ31A special grade, .032 in., 163.10; .081 in., 103.50; .188 in., 91.10; .250-2.0, 88.90. Tread plate, .188 in., 66.90; .250-2.0 in., 67.50. Tooling plate, .250-3.0 in., 70.20.

Extruded Solid Shapes:

Factor	Com. Grade (FS)	Spec. Grade (AZ31B)
6-8	66.40-69.00	81.40-84.00
12-14	67.50-69.60	82.50-84.60
24-26	72.10-72.70	87.10-87.70
36-38	84.90-85.50	99.90-100.50

NONFERROUS SCRAP

DEALERS BUYING PRICES

(Cents per pound, New York, in ton lots)

Aluminum: 1100 clippings, 16.50-17.00; old sheets, 13.00-13.50; borings and turnings, 8.00-8.50; crankcases, 13.00-13.50; industrial castings, 13.00-13.50.

Copper and Brass: No. 1 heavy copper and wire, 29.50-30.00; No. 2 heavy copper and wire, 27.00-27.50; light copper, 25.00-25.50; No. 1 composition red brass, 23.00-23.50; No. 1 composition turnings, 22.50-23.00; yellow brass

BRASS MILL PRICES

	MILL PRODUCTS a				SCRAP ALLOWANCES f		
	Sheet, Strip, Plate	Rod	Wire	Seamless Tube	Clean Heavy	Rod Ends	Clean Turnings
Copper	67.13b	64.36c	....	67.32	42.000	42.000	41.250
Yellow Brass	55.60	45.65d	56.14	56.51	31.250	31.000	29.000
Low Brass, 80%	60.15	60.09	62.96	63.375	35.125	34.625	34.625
Red Brass, 85%	61.79	61.73	62.33	64.69	37.000	36.750	36.250
Com. Bronze, 90%	63.98	63.92	64.52	66.54	38.500	38.250	37.750
Manganese Bronze	62.68	56.76	67.00	....	28.875	28.625	28.125
Muntz Metal	56.94	52.78	....	....	29.125	28.875	28.375
Naval Brass	58.84	53.15	65.90	62.06	28.875	28.625	28.125
Silicon Bronze	70.48	69.67	70.53	75.50e	40.750	40.500	39.750
Nickel Silver, 10%	70.16	72.49g	72.49	....	35.625	35.375	17.813
Phos. Bronze, A, 5%	84.92	85.42	85.42	86.60	42.125	41.875	40.875

a. Cents per lb, f.o.b. mill; freight allowed on 500 lb or more. b. Hot-rolled. c. Cold-drawn. d. Free cutting. e. 3% silicon. f. Prices in cents per lb for less than 20,000 lb, f.o.b. shipping point. On lots over 20,000 lb at one time, of any or all kinds of scrap, add 1 cent per lb. g. Leaded

turnings, 13.00-13.50; new brass clippings, 22.50-23.00; light brass, 14.50-15.00; heavy yellow brass, 15.50-16.00; new brass rod ends, 20.50-21.00; auto radiators, unsweated, 18.00-18.50; cocks and faucets, 19.00-19.50; brass pipe, 18.00-18.50.

Lead: Heavy, 12.50-12.75; battery plates, 6.50-6.75; linotype and stereotype, 13.50-14.00; electrotype, 12.75-13.00; mixed babbitt, 14.50.

Monel: Clippings, 55.00-85.00; old sheets, 55.00-85.00; turnings, 60.00-70.00; rods, 55.00-85.00.

Nickel: Sheets and clips, 90.00-190.00; rolled anodes, 90.00-190.00; turnings, 80.00-150.00; rod ends, 90.00-190.00.

Zinc: Old zinc, 5.00-5.50; new die-cast scrap, 4.00-4.50; old die-cast scrap, 3.00.

REFINER'S BUYING PRICES

(Cents per pound, carlots, delivered refinery)

Aluminum: 1100 clippings, 18.00-19.00; 3003 clippings, 18.00-18.75; 6151 clippings, 18.00-18.75; 5052 clippings, 18.00-18.75; 2014 clippings, 17.00-18.25; 2017 clippings, 17.00-18.25; 2024 clippings, 17.00-18.25; mixed clippings, 17.00-17.25; old sheet 15.75-16.00; old cast, 15.75-16.00; clean old cable (free of steel), 17.50-18.00; borings and turnings, 15.25-16.50.

Beryllium Copper: Heavy scrap, 0.020-in. and heavier, not less than 1.5% Be, 68.00; light scrap, 63.00; turnings and borings, 48.00.

Copper and Brass: No. 1 heavy copper and wire, 32.00; No. 2 heavy copper and wire, 29.00; light copper, 26.75; refinery brass (60% copper) per dry copper content, 28.00-28.50.

INGOTMAKERS' BUYING PRICES

(Cents per pound, carlots, delivered)

Copper and Brass: No. 1 heavy copper and wire, 32.00; No. 2 heavy copper and wire, 29.00; light copper, 26.75; No. 1 composition borings, 25.00; No. 1 composition solids, 25.50; heavy yellow brass solids, 17.00; yellow brass turnings, 16.00; radiators, 19.50.

PLATING MATERIAL

(F.o.b. shipping point, freight allowed on quantities)

ANODES

Cadmium: Special or patented shapes, $1.70 per lb.

Copper: Flat-rolled, 63.79; oval 62.92. 5000-10,000 lb; electrodeposited, 52.75; 2000-5000 lb lots; cast, 55.04-59.54, 5000-10,000 lb quantities.

Nickel: Depolarized, less than 100 lb, $1.015; 100-499 lb, 99.50; 500-4999 lb, 95.50; 5000-29,999 lb, 93.50; 30,000 lb, 91.50. Carbonized, deduct 3 cents a lb. All prices eastern delivery, effective Jan. 1, 1955.

Tin: Bar or slab, less than 200 lb, 111.50; 200-499 lb, 110.00; 500-999 lb, 109.50; 1000 lb or more, 109.00.

Zinc: Balls, 21.00; flat tops, 21.00; flats, 22.75; ovals, 22.00, ton lots.

CHEMICALS

Cadmium Oxide: $2.15 per lb, in 100-lb drums.

Chromic Acid: Less than 10,000 lb, 28.50; over 10,000 lb, 27.50.

Copper Cyanide: 100 lb, 85.25; 200 lb, 84.50; 300 lb, 84.25; 400-900 lb, 83.50; 1000 lb, 81.50.

Copper Sulphate: 500-1900 lb, 17.90; 2000-5900 lb, 15.90; 6000 lb or more, 15.65.

Nickel Chloride: 100 lb, 46.50; 200 lb, 44.50; 300 lb, 42.50; 400-4900 lb, 41.50; 5000-9900 lb, 39.5; 10,000 lb and over, 38.50. All prices eastern delivery, effective Jan. 1, 1955.

Nickel Sulphate: 100 lb, 38.25; 200 lb, 36.25; 300 lb, 35.25; 400-4900 lb, 30.35; 5000-35,900 lb, 31.25; 36,000 lb, 30.35. All prices eastern delivery, effective Jan. 1, 1955.

Silver Cyanide: (Cents per ounce) 4-oz bottle, 86.875; 15-oz bottle, 85.625; 80-oz bottle, 83.125; 100-oz bottle, 83.125; f.o.b. St. Louis, New York and Los Angeles. Effective Sept. 30, 1955.

Sodium Cyanide: Egg, under 1000 lb, 19.80; 1000-19,900 lb, 18.80; 20,000 lb and over, 17.80; granular, add 1-cent premium to above.

Sodium Stannate: Less than 100 lb, 67.90; 100-600 lb, 59.80; 700-1900 lb, 57.30; 2000-9900 lb, 55.60; 10,000 lb or more, 54.40.

Stannous Chloride (anhydrous): Less than 25 lb, 164.10; 25 lb, 129.10; 100 lb, 114.10; 400 lb, 111.60; 5200-19,600 lb, 99.40; 20,000 lb or more, 87.20.

Stannous Sulphate: Less than 50 lb, 126.90; 50 lb, 96.90; 100-1900 lb, 94.90; 2000 lb or more, 92.90.

Zinc Cyanide: Under 1000 lb, 54.30; 1000 lb and over, 52.30.

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TWO TYPICAL EXAMPLES

Iron Alloys		Aluminum Alloys	
Si	0.05-3.00%	Fe	0.10-1.00%
Mn	0.05-2.00%	Si	0.10-14.00%
Cu	0.05-1.00%	Cu	0.05-5.00%
Ni	0.05-5.00%	Zn	0.05-0.50%
Mo	0.10-2.00%	Ti	0.05-0.50%
Cr	0.05-5.00%	Cr	0.05-0.50%
V	0.05-1.00%	Mg	0.10-6.00%

*Approximate price depending on analytical requirements. Ask an ARL field engineer for an analysis of your problems.

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Steel Prices

Mill prices as reported to STEEL, cents per pound except as otherwise noted. *Changes shown in italics.* Code numbers following mill points indicate producing company. Key to producers, page 133; to footnotes, page 135

SEMIFINISHED

INGOTS, Carbon, Forging (NT)

Munhall,Pa. U5 ..... $65.50

INGOTS, Alloy (NT)

Detroit R7 ..... $69.00
Houston 85 ..... 74.00
Midland,Pa. C18 ..... 69.00
Munhall,Pa. U5 ..... 69.00

BILLETS, BLOOMS & SLABS Carbon, Rerolling (NT)

Aliquippa,Pa. J5 ..... $68.50
Bessemer,Pa. U5 ..... 68.50
Bridgeport,Conn. N19 .. 73.50
Buffalo R2 ..... 68.50
Clairton,Pa. U5 ..... 68.50
Ensley,Ala. T2 ..... 68.50
Fairfield,Ala. T2 ..... 68.50
Fontana,Calif. K1 ..... 78.00
Gary,Ind. U5 ..... 68.50
Johnstown,Pa. B2 ..... 68.50
Lackawanna,N.Y. B2 .. 68.50
LoneStar,Tex. L6 ..... 74.50
Munhall,Pa. U5 ..... 68.50
Pittsburgh J5 ..... 68.50
S.Chicago,Ill. R2, U5 .. 68.50
S.Duquesne,Pa. U5 ..... 68.50
Youngstown R2 ..... 68.50

Carbon, Forging (NT)

Aliquippa,Pa. J5 ..... $84.50
Bessemer,Pa. U5 ..... 84.50
Bridgeport,Conn. N19 .. 89.50
Buffalo R2 ..... 84.50
Canton,O. R2 ..... 86.50
Clairton,Pa. U5 ..... 84.50
Conshohocken,Pa. A3 .. 89.50
Ensley,Ala. T2 ..... 84.50
Fairfield,Ala. T2 ..... 84.50
Fontana,Calif. K1 ..... 94.00
Gary,Ind. U5 ..... 84.50
Geneva,Utah C11 ..... 84.50
Houston 85 ..... 101.00
Johnstown,Pa. B2 ..... 84.50
Lackawanna,N.Y. B2 .. 84.50
LosAngeles B3 ..... 94.00
Midland,Pa. C18 ..... 84.50
Munhall,Pa. U5 ..... 84.50
Pittsburgh J5 ..... 84.50
Seattle B3 ..... 98.00
S.Chicago R2,U5,W14 .. 84.50
S.Duquesne,Pa. U5 ..... 84.50
S.SanFrancisco B3 ..... 94.00

Alloy, Forging (NT)

Bethlehem,Pa. B2 ..... $98.00
Buffalo R2 ..... 98.00
Canton,O. R2, T7 ..... 98.00
Conshohocken,Pa. A3 .. 103.00
Detroit R7 ..... 98.00
Fontana,Calif. K1 ..... 117.00
Gary,Ind. U5 ..... 96.00
Houston 85 ..... 105.00
Ind.Harbor,Ind. Y1 ..... 96.00
Johnstown,Pa. B2 ..... 96.00
Lackawanna,N.Y. B2 .. 96.00
LosAngeles B3 ..... 116.00
Massillon,O. R2 ..... 96.00
Midland,Pa. C18 ..... 96.00
Munhall,Pa. U5 ..... 96.00
S.Chicago R2,U5,W14 .. 96.00
S.Duquesne,Pa. U5 ..... 96.00
Struthers,O. Y1 ..... 96.00
Warren,O. C17 ..... 106.00

ROUNDS, SEAMLESS TUBE (NT)

Buffalo R2 ..... $103.50
Canton,O. R2 ..... 103.50
Cleveland R2 ..... 103.50
Gary,Ind. U5 ..... 103.50
S.Chicago R2, W14 .. 103.50
S.Duquesne,Pa. U5 .. 103.50

SKELP

Aliquippa,Pa. J5 ..... 4.325
LoneStar,Tex. L6 ..... 4.525
Munhall,Pa. U5 ..... 4.225
SparrowsPoint,Md. B2 .. 4.225
Warren,O. R2 ..... 4.225
Youngstown R2, U5 .. 4.225

WIRE RODS

AlabamaCity,Ala. R2 .. 5.375
Aliquippa,Pa. J5 ..... 5.375
Alton,Ill. L1 ..... 5.55
Buffalo W12 ..... 5.375
Cleveland A7 ..... 5.375
Donora,Pa. A7 ..... 5.375
Fairfield,Ala. T2 ..... 5.375
Houston 85 ..... 5.625
IndianaHarbor,Ind. Y1 .. 5.375
Johnstown,Pa. B2 ..... 5.375
Joliet,Ill. A7 ..... 5.375
KansasCity,Mo. S5 ..... 5.625
Kokomo,Ind. C16 ..... 5.475
LosAngeles B3 ..... 6.175
Minnequa,Colo. C10 ... 5.625
Monessen,Pa. P7 ..... 5.375
N.Tonawanda,N.Y. B11 5.375
Pittsburg,Calif. C11 .. 6.025
Portsmouth,O. P12 ... 5.375
Roebling,N.J. R5 ..... 5.475
S.Chicago,Ill. R2 ..... 5.375
SparrowsPoint,Md. B2 .. 5.475
Sterling Ill.(1) N15 ... 5.375
Sterling,Ill. N15 ..... 5.475
Struthers,O. Y1 ..... 5.375
Worcester,Mass. A7 .. 5.675

STRUCTURALS

Carbon Steel Std. Shapes

Ala.City,Ala. R2 ..... 4.60
Aliquippa,Pa. J5 ..... 4.60
Bessemer,Ala. T2 ..... 4.60
Bethlehem,Pa. B2 ..... 4.65
Birmingham C15 ..... 5.10
Clairton,Pa. U5 ..... 4.60
Fairfield,Ala. T2 ..... 4.60
Fontana,Calif. K1 ..... 5.30
Gary,Ind. U5 ..... 4.60
Geneva,Utah C11 ..... 4.60
Houston 85 ..... 4.70
Ind.Harbor,Ind. I-2 .... 4.60
Johnstown,Pa. B2 ..... 4.65
KansasCity,Mo. S5 ..... 4.70
Lackawanna,N.Y. B2 .. 4.65
LosAngeles B3 ..... 5.30
Minnequa,Colo. C10 .... 4.90
Munhall,Pa. U5 ..... 4.60
Niles,Calif. P1 ..... 5.25
Phoenixville,Pa. P4 .... 5.15
Portland,Oreg. O4 .... 5.35
Seattle B3 ..... 5.35
S.Chicago U5, W14 .... 4.60
S.SanFrancisco B3 .... 5.25
Torrance,Calif. C11 .... 5.30
Weirton,W.Va. W6 .... 4.60

Wide Flange

Bethlehem,Pa. B2 .... 4.65
Clairton,Pa. U5 ..... 4.60
Fontana,Calif. K1 .... 5.45
Lackawanna,N.Y. B2 .. 4.65
Munhall,Pa. U5 ..... 4.60
Phoenixville,Pa. P4 .... 5.15
S.Chicago,Ill. U5 ..... 4.60

Alloy Std. Shapes

Clairton,Pa. U5 ..... 5.65
Fontana,Calif. K1 ..... 7.40
Gary,Ind. U5 ..... 5.65
Houston 85 ..... 5.75
Munhall,Pa. U5 ..... 5.65
S.Chicago,Ill. U5 ..... 5.65

H.S., L.A. Std. Shapes

Aliquippa,Pa. J5 ..... 6.75
Bessemer,Ala. T2 ..... 6.75
Bethlehem,Pa. B2 ..... 6.80
Clairton,Pa. U5 ..... 6.75
Fairfield,Ala. T2 ..... 6.75
Fontana,Calif. K1 ..... 7.45
Gary,Ind. U5 ..... 6.75
Geneva,Utah C11 ..... 6.75
Houston 85 ..... 6.85
Ind.Harbor,Ind. I-2, Y1 .. 6.75
Johnstown,Pa. B2 ..... 6.80
KansasCity,Mo. S5 ..... 6.85
Lackawanna,N.Y. B2 .. 6.80
LosAngeles B3 ..... 7.40
Munhall,Pa. U5 ..... 6.75
Seattle B3 ..... 7.50
S.Chicago,Ill. U5, W14 .. 6.75
S.SanFrancisco B3 ..... 7.40
Struthers,O. Y1 ..... 6.75

H.S., L.A. Wide Flange

Bethlehem,Pa. B2 ..... 6.80
Lackawanna,N.Y. B2 .. 6.80
Munhall,Pa. U5 ..... 6.75
S.Chicago,Ill. U5 ..... 6.75

PILING

BEARING PILES

Bethlehem,Pa. B2 ..... 4.65
Lackawanna,N.Y. B2 .. 4.65
Munhall,Pa. U5 ..... 4.60
S.Chicago,Ill. U5 ..... 4.60

STEEL SHEET PILING

Ind.Harbor,Ind. I-2 .... 5.45
Lackawanna,N.Y. B2 .. 5.45
Munhall,Pa. U5 ..... 5.45
S.Chicago,Ill. U5 ..... 5.45

PLATES

PLATES, Carbon Steel

Ala.City,Ala. R2 ..... 4.50
Aliquippa,Pa. J5 ..... 4.50
Ashland,Ky.(15) A10 .. 4.50
Bessemer,Ala. T2 ..... 4.50
Bridgeport,Conn. N19 .. 4.75
Buffalo R2 ..... 4.50
Clairton,Pa. U5 ..... 4.50
Claymont,Del. C22 .... 5.35
Cleveland J5, R2 ..... 4.60
Coatesville,Pa. L7 ..... 4.80
Conshohocken,Pa. A3 .... 4.95
Detroit M1 ..... 4.60
Ecorse,Mich. G5 ..... 4.60
Fairfield,Ala. T2 ..... 4.50
Fontana,Calif.(30) K1 .. 5.20
Gary,Ind. U5 ..... 4.50
Geneva,Utah C11 ..... 4.50
GraniteCity,Ill. G4 .... 4.70
Harrisburg,Pa. P4 .... 5.10
Houston 85 ..... 4.60
Ind.Harbor,Ind. I-2, Y1 .. 4.50
Johnstown,Pa. B2 ..... 4.50
Lackawanna,N.Y. B2 .. 4.50
LoneStar,Tex. L6 ..... 4.85
Mansfield,O. E6 ..... 4.50
Minnequa,Colo. C10 .... 5.35
Munhall,Pa. U5 ..... 4.50
Newport,Ky. N9 ..... 4.50
Pittsburgh J5 ..... 4.50
Riverdale,Ill. A1 ..... 4.725
Seattle B3 ..... 5.40
Sharon,Pa. S3 ..... 4.50
S.Chicago R2, U5, W14 4.50
SparrowsPoint,Md. B2 .. 4.50
Steubenville,O. W10 .... 4.50
Warren,O. R2 ..... 4.50
Weirton,W.Va. W8 .... 4.50
Youngstown R2, U5, Y1 .. 4.50

PLATES, Carbon Abras. Resist.

Claymont,Del. C22 .... 6.20
Fontana,Calif. K1 .... 6.35
Geneva,Utah C11 ..... 5.65
Johnstown,Pa. B2 ..... 5.65
SparrowsPoint,Md. B2 .. 5.65

PLATES, Wrought Iron

Economy,Pa. B14 ..... 10.40

PLATES, High-Strength Low-Alloy

Aliquippa,Pa. J5 ..... 6.725
Bessemer,Ala. T2 .... 6.725
Clairton,Pa. U5 ..... 6.725
Cleveland J5, R2 .... 6.725
Claymont,Del. C22 .... 6.725
Coatesville,Pa. L7 .... 7.025
Conshohocken,Pa. A3 .. 7.175
Ecorse,Mich. G5 ..... 6.825
Fairfield,Ala. T2 .... 6.725
Fontana,Calif.(30) K1 .. 7.425
Gary,Ind. U5 ..... 6.725
Geneva,Utah C11 .... 6.725
Houston 85 ..... 6.825
Ind.Harbor,Ind. I-2, Y1 .. 6.725
Johnstown,Pa. B2 .... 6.725
Munhall,Pa. U5 ..... 6.725
Pittsburgh J5 ..... 6.725
Seattle B3 ..... 7.625
Sharon,Pa. S3 ..... 6.725
S.Chicago,Ill. U5, W14 .. 6.725
SparrowsPoint,Md. B2 .. 6.725
Warren,O. R2 ..... 6.725
Youngstown U5, Y1 ... 6.725

PLATES, Alloy

Bridgeport,Conn. N19 ... 6.55
Claymont,Del. C22 .... 6.30
Coatesville,Pa. L7 .... 6.30
Fontana,Calif. K1 .... 7.00
Gary,Ind. U5 ..... 6.30
Houston 85 ..... 6.40
Ind.Harbor,Ind. Y1 .... 6.30
Johnstown,Pa. B2 ..... 6.30
Munhall,Pa. U5 ..... 6.30
Newport,Ky. N9 ..... 6.30
Seattle B3 ..... 7.20
Sharon,Pa. S3 ..... 6.30
S.Chicago,Ill. U5, W14 .. 6.30
SparrowsPoint,Md. B2 .. 6.30
Youngstown Y1 ..... 6.30

FLOOR PLATES

Cleveland J5 ..... 5.575
Conshohocken,Pa. A3 .. 5.575
Harrisburg,Pa. P4 .... 5.575
Ind.Harbor,Ind. I-2 .... 5.575
Munhall,Pa. U5 ..... 5.575
S.Chicago,Ill. U5 .... 5.575

PLATES, Ingot Iron

Ashland c.l. (15) A10 .. 4.75
Ashland l.c.l. (15) A10 .. 5.25
Cleveland c.l. R2 ..... 5.10
Warren,O. c.l. R2 ..... 5.10

BARS

BARS, Hot-Rolled Carbon (Merchant Quality)

Ala.City,Ala.(9) R2 .... 4.65
Aliquippa,Pa.(9) J5 .... 4.65
Alton,Ill. L1 ..... 4.85
Atlanta(9) A11 ..... 5.15
Bessemer,Ala.(9) T2 .... 4.65
Birmingham C15 ..... 5.15
Bridgeport,Conn. N19 .. 4.80
Buffalo(9) R2 ..... 4.65
Canton,O.(9) R2 ..... 4.75
Clairton,Pa.(9) U5 .... 4.65
Cleveland(9) R2 ..... 4.65
Ecorse,Mich.(9) G5 .... 4.75
Emeryville,Calif. J7 .... 5.40
Fairfield,Ala.(9) T2 .... 4.65
Fairless,Pa.(9) U5 .... 4.80
Fontana,Calif. K1 .... 5.35
Gary,Ind.(9) U5 ..... 4.65
Houston(9) S5 ..... 4.90
Ind.Harbor,Ind.(9) I-2, .. 4.65
Ind.Harbor,Ind. Y1 .... 4.65
Johnstwn,Pa.(9) B2 .... 4.65
Joliet,Ill. P22 ..... 5.15
KansasCity,Mo.(9) S5 .. 4.90
Lackawanna(9) B2 .... 4.65
LosAngeles(9) B3 ..... 5.35
Massillon,O.(9) R2 .... 4.75
Midland,Pa.(9) C18 .... 4.65
Milton,Pa. M18 ..... 4.80
Minnequa,Colo. C10 .... 5.10
Niles,Calif. P1 ..... 5.35
N.Tonawanda,N.Y.(9) B11 4.65
Pittsburg,Calif.(9) C11 .. 5.35
Pittsburgh(9) J5 ..... 4.65
Portland,Oreg. O4 .... 5.40
Seattle B3, N14 ..... 5.40
S.Chicago W14 ..... 4.65
S.Chicago,Ill.(9) R2, U5 4.65
S.Duquesne,Pa.(9) U5 .. 4.65
S.SanFran.,Calif.(9) B3 .. 5.40
Sterling,Ill.(1) N15 .... 4.65
Sterling,Ill. N15 ..... 4.75
Struthers,O. Y1 ..... 4.65
Torrance,Calif.(9) C11 .. 5.35
Warren,O.(9) R2 ..... 4.65
Weirton,W.Va.(9) W6 .... 4.65
Youngstown(9) R2, U5 .. 4.65

BARS, H.R. Loaded Alloy

Warren,O. C17 ..... 7.075

BARS, Hot-Rolled Alloy

Bethlehem,Pa. B2 .... 5.575
Bridgeport,Conn. N19 .. 5.725
Buffalo R2 ..... 5.575
Canton,O. R2, T7 .... 5.575
Clairton,Pa. U5 ..... 5.575
Detroit R7 ..... 5.575
Ecorse,Mich. G5 ..... 5.675
Fairless,Pa. U5 ..... 5.725
Fontana,Calif. K1 .... 6.625
Gary,Ind. U5 ..... 5.575
Houston 85 ..... 5.825
Ind.Harbor,Ind. I-2, Y1 .. 5.575
Johnstown,Pa. B2 ..... 5.575
KansasCity,Mo. S5 .... 5.825
Lackawanna,N.Y. B2 .. 5.575
LosAngeles B3 ..... 6.625
Massillon,O. R2 ..... 5.575
Midland,Pa. C18 ..... 5.575
S.Chicago R2, U5, W14 5.575
S.Duquesne,Pa. U5 .... 5.575
Struthers,O. Y1 ..... 5.575
Warren,O. C17 ..... 6.075
Youngstown U5 ..... 5.575

BARS & SMALL SHAPES, H.R. High-Strength Low-Alloy

Aliquippa,Pa. J5 ..... 6.80
Bessemer,Ala. T2 ..... 6.80
Bethlehem,Pa. B2 ..... 6.80
Clairton,Pa. U5 ..... 6.80
Cleveland R2 ..... 6.80
Ecorse,Mich. G5 ..... 6.90
Fairfield,Ala. T2 ..... 6.80
Fontana,Calif. K1 .... 7.50
Gary,Ind. U5 ..... 6.80
Houston 85 ..... 7.05
Ind.Harb.,Ind. I-2, Y1 .. 6.80
Johnstown,Pa. B2 ..... 6.80
KansasCity,Mo. S5 .... 7.05
Lackawanna,N.Y. B2 .. 6.80
LosAngeles B3 ..... 7.50
Pittsburgh J5 ..... 6.80
Seattle B3 ..... 7.55
S.Chicago W14 ..... 6.80
S.Duquesne,Pa. U5 .... 6.80
S.SanFrancisco B3 .... 7.55
Struthers,O. Y1 ..... 6.80
Warren,O. R2 ..... 6.80
Youngstown U5 ..... 6.80

BAR SIZE ANGLES, H.R. Carbon

Bethlehem,Pa.(9) B2 .... 4.80
Lackawanna(9) B2 .... 4.65

BAR SIZE ANGLES, S. Shapes

Aliquippa,Pa. J5 ..... 4.65
Atlanta A11 ..... 5.15
Fontana,Calif. K1 ..... 5.35
Joliet,Ill. P22 ..... 5.10
Niles,Calif. P1 ..... 5.35
Pittsburgh J5 ..... 4.65
Portland,Oreg. O4 ..... 5.40
SanFrancisco S7 ..... 5.05

BAR SHAPES, Hot-Rolled Alloy

Clairton,Pa. U5 ..... 5.65
Gary,Ind. U5 ..... 5.65
Houston S5 ..... 5.90
KansasCity,Mo. S5 .... 5.90
Youngstown U5 ..... 5.65

BARS, C.F. Loaded Alloy

Ambridge,Pa. W18 .... 8.325
Camden,N.J. P13 ..... 8.35
Chicago W18 ..... 8.325
Cleveland C20 ..... 8.325
Monaca,Pa. S17 ..... 8.325
Newark,N.J. W18 .... 8.50
SpringCity,Pa. K3 .... 8.30
Warren,O. C17 ..... 9.075

BARS, Cold-Finished Carbon

Ambridge,Pa. W18 .... 6.25
BeaverFalls,Pa. M12,R2 6.25
Buffalo B5 ..... 6.30
Camden,N.J. P13 ..... 6.70
Carnegie,Pa. C12 ..... 6.25
Chicago W18 ..... 6.25
Cleveland A7, C20 .... 6.25
Detroit B5, P17 ..... 6.45
Detroit R7 ..... 6.25
Donora,Pa. A7 ..... 6.25
Elyria,O. W8 ..... 6.25
FranklinPark,Ill. N5 .... 6.25
Gary,Ind. R2 ..... 6.25
GreenBay,Wis. P7 ..... 6.25
Hammond,Ind. L2, M13 6.25
Hartford,Conn. R2 .... 6.75
Harvey,Ill. B5 ..... 6.25
LosAngeles(49) S30 .... 7.70
LosAngeles R2 ..... 7.70
Mansfield,Mass. B5 .... 6.80
Massillon,O. R2, R8 .... 6.25
Midland,Pa. C18 ..... 6.25
Monaca,Pa. S17 ..... 6.25
Newark,N.J. W18 .... 6.70
NewCastle,Pa.(17) B4 .. 6.25
Pittsburgh J5 ..... 6.25
Plymouth,Mich. P5 .... 6.50
Putnam,Conn. W18 .... 6.80
Readville,Mass. C14 .... 6.80
S.Chicago,Ill. W14 .... 6.25
SpringCity,Pa. K3 .... 6.70
Struthers,O. Y1 ..... 6.25
Waukegan,Ill. A7 ..... 6.25
Worcester,Mass. W19 .. 6.70
Youngstown F3, Y1 .... 6.25

BARS, Cold-Finished Carbon (Turned and Ground)

Cumberland,Md.(5) C19 5.15

BARS, Cold-Finished Alloy

Ambridge,Pa. W18 .... 7.425
BeaverFalls,Pa. M12,R2 7.425
Bethlehem,Pa. B2 ..... 7.425
Buffalo B5 ..... 7.425
Camden,N.J. P13 ..... 7.60
Canton,O. T7 ..... 7.425
Carnegie,Pa. C12 .... 7.425
Chicago W18 ..... 7.425
Cleveland A7, C20 .... 7.425
Detroit R7 ..... 7.425
Detroit B5, P17 ..... 7.625
Donora,Pa. A7 ..... 7.425
Elyria,O. W8 ..... 7.425
Gary,Ind. R2 ..... 7.425
GreenBay,Wis. P7 ..... 7.425
Hammond,Ind. L2, M13 7.425
Hartford,Conn. R2 .... 7.725
Harvey,Ill. B5 ..... 7.425
Lackawanna,N.Y. B2 .. 7.425
LosAngeles S30 ..... 9.10
Mansfield,Mass. B5 .. 7.725
Massillon,O. R2, R8 .... 7.425
Midland,Pa. C18 ..... 7.425
Monaca,Pa. S17 ..... 7.425
Newark,N.J. W18 .... 7.60
Plymouth,Mich. P5 .... 7.625
S.Chicago W14 ..... 7.425
SpringCity,Pa. K3 .... 7.60
Struthers,O. Y1 ..... 7.425
Warren,O. C17 ..... 7.925
Waukegan,Ill. A7 .... 7.425
Worcester,Mass. A7 .... 7.725
Youngstown F3, Y1 .... 7.425

BARS, Reinforcing (To Fabricators)

Ala.City,Ala. R2 ..... 4.65
Atlanta A11 ..... 5.15
Birmingham C15 ..... 5.15
Buffalo R2 ..... 4.65
Cleveland R2 ..... 4.65
Ecorse,Mich. G5 ..... 4.75
Emeryville,Calif. J7 .... 5.40
Fairfield,Ala. T2 ..... 4.65
Fairless,Pa. U5 ..... 4.80
Fontana,Calif. K1 .... 5.35
Ft.Worth,Tex.(42) T4 .. 5.10
Gary,Ind. U5 ..... 4.65
Houston 85 ..... 4.90

Ind.Harbor,Ind. I-2, Y1 4.65
Johnstown,Pa. B2 ....4.65
Joliet,Ill. P22 .....5.15
KansasCity,Mo. S5 ....4.90
Lackawanna,N.Y. B2 ..4.65
LosAngeles B3 .....5.35
Milton,Pa. M18 .....4.80
Minnequa,Colo. C10 ....5.10
Niles,Calif. P1 .....5.35
Pittsburg,Calif. C11 ....5.35
Pittsburgh J5 .....4.65
Portland,Oreg. O4 .....5.40
SandSprings,Okla. S5 ..5.15
Seattle B3, N14 .....5.40
S.Chicago R2 .....4.65
S.Duquesne,Pa. U5 ....4.65
S.SanFrancisco B3 ....5.40
SparrowsPoint,Md. B2 ..4.65
Sterling,Ill.(1) N15 ....4.65
Sterling,Ill. N15 .....4.75
Struthers,O. Y1 .....4.65
Torrance,Calif. C11 ....5.35
Youngstown R2, U5 ....4.65

BARS, Reinforcing
(Fabricated; to Consumers)

Johnstown,Pa. ¼-1" B2.6.15
KansasCity,Kans. S5 ...6.45
Lackawanna,N.Y. B2 ..6.17
Marion,O. P11 .....6.15
Pittsburgh U5 .....6.17
Seattle B3, N14 .....6.60
SparrowsPt. ½-1" B2 ..6.15
Williamsport,Pa. S19 ..6.00

RAIL STEEL BARS

ChicagoHts.(3) C2, I-2..4.65
ChicagoHts.(4) C2, I-2..4.65
Ft.Worth,Tex.(26) T4 ..5.10
Franklin,Pa.(3) P5 ....4.65
Franklin,Pa.(4) P5 ....4.65
JerseyShore,Pa.(4) J8 ..4.65
Marion,O.(3) P11 .....4.65
Moline,Ill.(3) R2 .....4.80
Tonawanda(3) B12 ....5.15
Tonawanda(4) B12 ....5.15
Williamsport,Pa.(3) S19.4.65

BARS, Wrought Iron

Economy,Pa.(S.R.)B14 11.50
Economy,Pa.(D.R.)B14 14.30
Economy(Staybolt)B14, 14.65
McK.Rks.(S.R.) L5 ...11.50
McK.Rks.(D.R.) L5 ...14.00
McK.Rks.(Staybolt) L5.17.00

SHEETS

SHEETS, Hot-Rolled Steel
(10 Gage and Heavier)

Ala.City,Ala. R2 .....4.325
Allenport,Pa. P7 .....4.325
Ashland,Ky.(8) A10 ..4.325
Cleveland J5, R2 .....4.325
Conshohocken,Pa. A3 ..4.775
Detroit(6) M1 .....4.425
Dravosburg,Pa. U5 ...4.325
Ecorse,Mich. G5 .....4.425
Fairfield,Ala. T2 .....4.325
Fairless,Pa. U5 .....4.375
Fontana,Calif. K1 ....5.125
Gary,Ind. U5 .....4.325
Geneva,Utah C11 .....4.425
GraniteCity,Ill. G4 ....4.525
Ind.Harbor,Ind. I-2, Y1.4.325
Lackawanna,N.Y. B2 ..4.325
Mansfield,O. E6 (37) ..4.325
Munhall,Pa. U5 .....4.325
Newport,Ky.(8) N9 ...4.325
Niles,O. M21 .....4.325
Pittsburg,Calif. C11 ...5.025
Pittsburgh J5 .....4.325
Portsmouth,O. P12 ....4.325
Riverdale,Ill. A1 .....4.55
Sharon,Pa. S3 .....4.325
S.Chicago,Ill. W14 ....4.325
SparrowsPoint,Md. B2.4.325
Steubenville,O. W10 ...4.325
Warren,O. R2 .....4.325
Weirton,W.Va. W6 ....4.325
Youngstown U5, Y1 ...4.325

SHEETS, H.R., (19 Ga. & Lighter)

Ala.City,Ala. R2 .....5.625
Niles,O. M21 .....5.325

SHEETS, H.R. Alloy

Dravosburg,Pa. U5 ....7.20
Gary,Ind. U5 .....7.30
Ind.Harbor,Ind. Y1 ....7.30
Youngstown Y1, U5 ....7.20

SHEETS, H.R. (14 Ga. & Heavier)
High-Strength Low-Alloy

Cleveland J5, R2 ....6.375
Conshohocken,Pa. A3 ..6.425
Dravosburg,Pa. U5 ...6.375
Ecorse,Mich. G5 .....6.475
Fairfield,Ala. T2 .....6.375
Fairless,Pa. U5 .....6.425
Fontana,Calif. K1 ....7.175
Gary,Ind. U5 .....6.375
Ind.Harbor,Ind. I-2, Y1.6.375
Lackawanna(35) B2 ..6.375
Munhall,Pa. U5 .....6.375
Pittsburgh J5 .....6.375
Sharon,Pa. S3 .....6.375
S.Chicago,Ill. U5 .....6.375
SparrowsPoint(36) B2..6.375
Warren,O. R2 .....6.375
Youngstown U5, Y1 ...6.375

SHEETS, Hot-Rolled Ingot Iron
(18 Gage and Heavier)

Ashland,Ky.(8) A10 ...4.575
Ind.Harbor,Ind. I-2 ...4.575

SHEETS, Cold-Rolled Steel
(Commercial Quality)

Allenport,Pa. P7 .....5.325
Cleveland J5, R2 .....5.325
Conshohocken,Pa. A3 ..5.725
Dravosburg,Pa. U5 ....5.325
Detroit M1 .....5.325
Ecorse,Mich. G5 .....5.425
Fairfield,Ala. T2 .....5.325
Fairless,Pa. U5 .....5.375
Follansbee,W.Va. F4 ..5.325
Fontana,Calif. K1 ....6.525
Gary,Ind. U5 .....5.325
GraniteCity,Ill. G4 ....5.525
Ind.Harbor,Ind. I-2, Y1.5.325
Lackawanna,N.Y. B2 ..5.325
Mansfield,O. E6 .....5.325
Middletown,O. A10 ....5.325
Newport,Ky. N9 .....5.325
Pittsburg,Calif. C11 ..6.275
Pittsburgh J5 .....5.325
Portsmouth,O. P12 ....5.325
SparrowsPoint,Md. B2..5.325
Steubenville,O. W10....5.325
Warren,O. R2 .....5.325
Weirton,W.Va. W6 ....5.325
Youngstown Y1 .....5.325

SHEETS, Cold-Rolled
High-Strength Low-Alloy

Cleveland J5, R2 .....7.875
Dravosburg,Pa. U5 ....7.875
Ecorse,Mich. G5 .....7.975
Fairless,Pa. U5 .....7.925
Fontana,Calif. K1 ....9.075
Gary,Ind. U5 .....7.875
IndianaHarbor,Ind. Y1.7.875
Lackawanna(37) B2 ..7.875
Pittsburgh J5 .....7.875
SparrowsPoint(38) B2..7.875
Warren,O. R2 .....7.875
Weirton,W.Va. W6 ....7.875
Youngstown Y1 .....7.875

SHEETS, Cold-Rolled Ingot Iron

Middletown,O. A10 ....5.525

SHEETS, Culvert	Cu Alloy	Cu Fe
Ashland,Ky. A10	6.20	6.45
Canton,O. R2	6.10	6.35
Dravosburg U5	6.10	...
Fairfield T2	6.10	...
Gary,Ind. U5	6.10	6.35
Ind.Harbor I-2	6.10	6.35
Kokomo,Ind. C10	6.20	...
MartinsFry. W10	6.10	...
Newport,Ky. N9	6.10	6.35
Pitts.,Calif. C11	6.85	...
SparrowsPt. B2	6.10	...

SHEETS, Culvert—Pure Iron

Gary,Ind. U5 .....6.35
MartinsFry,O. W10 ....6.35

SHEETS, Galvanized Steel
Hot-Dipped

Ala.City,Ala. R2 .....5.85†
Ashland,Ky. A10 .....5.85†
Canton,O. R2 .....5.85†
Dover,O. R1 .....5.85†
Dravosburg,Pa. U5 ....5.85†
Fairfield,Ala. T2 .....5.85†
Gary,Ind. U5 .....5.85•
GraniteCity,Ill. G4 ....6.05
Ind.Harbor,Ind. I-2 ...5.85†
Kokomo,Ind. C10 ....5.90‡
MartinsFerry,O. W10 ...5.85•
Middletown,O. A10 ....5.85†
Newport,Ky. N9 .....5.85‡
Pittsburg,Calif. C11 ...6.60•
Pittsburgh J5 .....5.85†
SparrowsPt. Md. B2 ...5.85†
Warren,O. R2 .....5.85†
Weirton,W.Va. W6 ....5.85•

•Continuous and noncontinuous. †Continuous. ‡Noncontinuous.

SHEETS, Well Casing

Fontana,Calif. K1 ....6.625

SHEETS, Galvanized
High-Strength Low-Alloy

Dravosburg,Pa. U5 ....8.60
SparrowsPoint(39) B2 ..8.60

SHEETS, Galvannealed Steel

Canton,O. R2 .....6.25
Dravosburg,Pa. U5 ....6.25
Kokomo,Ind. C16 .....6.60
Newport,Ky. N9 .....6.25

SHEETS, Galvanized Ingot Iron
(Hot-dipped Continuous)

Ashland,Ky. A10 .....6.10
Middletown,O. A10 ....6.10

SHEETS, Electrogalvanized

Cleveland(28) R2 .....6.70
Niles,O.(28) R2 .....6.70
Weirton,W.Va. W6 ....6.55

SHEETS, Aluminum Coated

Butler,Pa. A10 (type 1) 8.50
Butler,Pa. A10 (type 2) 8.60

SHEETS, Enameling Iron

Ashland,Ky. A10 .....5.90
Cleveland R2 .....5.90
Dravosburg,Pa. U5 ....5.90
Gary,Ind. U5 .....5.90
GraniteCity,Ill. G4 ....6.10
Ind.Harbor,Ind. I-2 ....5.90
Middletown,O. A10 ....5.90
Niles,O. M21 .....5.90
Youngstown Y1 .....5.90

BLUED STOCK, 29 Gage

Follansbee,W.Va. F4 ...7.75
Ind.Harbor,Ind. I-2 ....7.75
Yorkville,O. W10 .....7.75

SHEETS, Long Terne Steel
(Commercial Quality)

BeechBottom,W.Va. W10 6.25
Gary,Ind. U5 .....6.25
Mansfield,O. E6 .....6.25
Middletown,O. A10 ....6.25
Niles,O. M21 .....6.25
Weirton,W.Va. W6 ....6.25

SHEETS, Long Terne, Ingot Iron

Middletown,O. A10 ....6.65

Key To Producers

A1 Acme Steel Co.
A3 Alan Wood Steel Co.
A4 Allegheny Ludlum Steel
A5 Alloy Metal Wire Div., H. K. Porter Co. Inc.
A6 American Shim Steel Co.
A7 American Steel & Wire Div., U. S. Steel Corp.
A8 Anchor Drawn Steel Co.
A9 Angell Nail & Chaplet
A10 Armco Steel Corp.
A11 Atlantic Steel Co.

B1 Babcock & Wilcox Co.
B2 Bethlehem Steel Co.
B3 Beth. Pac. Coast Steel
B4 Blair Strip Steel Co.
B5 Bliss & Laughlin Inc.
B8 Braeburn Alloy Steel
B9 Brainard Steel Div., Sharon Steel Corp.
B10 E. & G. Brooke, Wickwire Spencer Steel Div. Colo. Fuel & Iron
B11 Buffalo Bolt Co., Div., Buffalo-Eclipse Corp.
B12 Buffalo Steel Corp.
B14 A. M. Byers Co.
B15 J. Bishop & Co.

C1 Calstrip Steel Corp.
C2 Calumet Steel Div. Borg-Warner Corp.
C4 Carpenter Steel Co.
C7 Cleve. Cold Rolling Mills
C8 Cold Metal Products Co.
C9 Colonial Steel Co.
C10 Colorado Fuel & Iron
C11 Columbia-Geneva Steel
C12 Columbia Steel & Shaft.
C13 Columbia Tool Steel Co.
C14 Compressed Steel Shaft.
C15 Connors Steel Div. H. K. Porter Co. Inc.
C16 Continental Steel Corp.
C17 Copperweld Steel Co.
C18 Crucible Steel Co.
C19 Cumberland Steel Co.
C20 Cuyahoga Steel & Wire
C22 Claymont Steel Products Dept. Wickwire Spencer Steel Division
C23 Charter Wire Inc.
C24 G. O. Carlson Inc.

D2 Detroit Steel Corp.
D3 Detroit Tube & Steel Div., Sharon Steel Corp.
D4 Disston & Sons, Henry
D6 Driver-Harris Co.
D7 Dickson Weatherproof Nail Co.
D8 Damascus Tube Co.
D9 Wilbur B. Driver Co.
E1 Eastern Gas&Fuel Assoc.
E2 Eastern Stainless Steel
E4 Electro Metallurgical Co.
E5 Elliott Bros. Steel Co.
E6 Empire Steel Corp.

F2 Firth Sterling Inc.
F3 Fitzsimmons Steel Co.
F4 Follansbee Steel Corp.
F5 Franklin Steel Div. Borg-Warner Corp.
F6 Frets-Moon Tube Co.
F7 Ft. Howard Steel & Wire
F8 Ft. Wayne Metals Inc.

G2 Globe Iron Co.
G4 Granite City Steel Co.
G5 Great Lakes Steel Corp.
G6 Greer Steel Co.

H1 Hanna Furnace Corp.
H7 Helical Tube Co.

I-1 Igoe Bros. Inc.
I-2 Inland Steel Co.
I-3 Interlake Iron Corp.
I-4 Ingersoll Steel Div., Borg-Warner Corp.
I-6 Ivins, E., Steel Tube
I-7 Indiana Steel & Wire Co.

J1 Jackson Iron & Steel Co.
J3 Jessop Steel Co.
J4 Johnson Steel & Wire Co.
J5 Jones & Laughlin Steel
J6 Joslyn Mfg. & Supply
J7 Judson Steel Corp.
J8 Jersey Shore Steel Co.

K1 Kaiser Steel Corp.
K2 Keokuk Electro-Metals
K3 Keystone Drawn Steel
K4 Keystone Steel & Wire
K7 Kenmore Metals Corp.

L1 Laclede Steel Co.
L2 LaSalle Steel Co.
L3 Latrobe Steel Co.
L5 Lockhart Iron & Steel
L6 Lone Star Steel Co.
L7 Lukens Steel Co.

M1 McLouth Steel Corp.
M4 Mahoning Valley Steel
M6 Mercer Pipe Div., Sawhill tubular Products
M8 Mid-States Steel & Wire
M12 Moltrup Steel Products
M13 Monarch Steel Div., Jones & Laughlin Steel Corp.
M14 McInnes Steel Co.
M16 Md. Fine&Special. Wire
M17 Metal Forming Corp.
M18 Milton Steel Prod., Div., Merritt-Chapman&Scott
M21 Mallory-Sharon Titanium Corp.

N1 National-Standard Co.
N2 National Supply Co.
N3 National Tube Div., U. S. Steel Corp.
N5 Nelsen Steel & Wire Co.
N6 New Eng. High Carb. Wire
N8 Newman-Crosby Steel
N9 Newport Steel Corp.
N14 Northwest SteelRoll.Mills
N15 Northwestern S.&W. Co.
N16 New Delphos Mfg. Co.
N19 Northeastern Steel Corp.
O3 Oliver Iron & Steel Corp.
O4 Oregon Steel Mills

P1 PacificStatesSteelCorp.
P2 Pacific Tube Co.
P4 Phoenix Iron & Steel Co. Sub. of Barium Steel Corp.
P5 Pilgrim Drawn Steel
P6 Pittsburgh Coke&Chem.
P7 Pittsburgh Steel Co.
P11 Pollak Steel Co.
P12 Portsmouth Division, Detroit Steel Corp.
P13 Precision Drawn Steel
P14 Pitts. Screw & Bolt Co.
P15 Pittsburg Metallurgical
P16 Page Steel & Wire Div., Amer. Chain & Cable
P17 Plymouth Steel Co.
P19 Pitts. Rolling Mills
P20 Prod. Steel Strip Corp.
P22 Phoenix Mfg. Co.

R1 Reeves Steel & Mfg. Co.
R2 Republic Steel Corp.
R3 Rhode Island Steel Corp.
R5 Roebling's Sons, John A.
R6 Rome Strip Steel Co.
R7 Rotary Electric Steel Co.
R8 Reliance Div.,Eaton Mfg.
R9 Rome Mfg. Co.
R10 Rodney Metals Inc.

S1 Seneca Wire & Mfg. Co.
S3 Sharon Steel Corp.
S4 Sharon Tube Co.
S5 Sheffield Steel Div., Armco Steel Corp.
S6 Shenango Furnace Co.
S7 Simmons Co.
S8 Simonds Saw & Steel Co.
S12 Spencer Wire Corp.
S13 Standard Forgings Corp.
S14 Standard Tube Co.
S15 Stanley Works
S17 Superior Drawn Steel Co.
S18 Superior Steel Corp.
S19 Sweet's Steel Co.
S20 Southern States Steel
S23 Superior Tube Co.
S25 Stainless Welded Prod.
S26 Specialty Wire Co. Inc.
S30 Sierra Drawn Steel Corp.
S40 Seneca Steel Service

T2 Tenn. Coal & Iron Div., U. S. Steel Corp.
T3 Tenn. Prod. & Chem.
T4 Texas Steel Co.
T5 Thomas Strip Division, Pittsburgh Steel Co.
T6 Thompson Wire Co.
T7 Timken Roller Bearing
T9 Tonawanda Iron Div. Am. Rad. & Stan. San.
T13 Tube Methods Inc.

U4 Universal-Cyclops Steel
U5 United States Steel Corp.
U6 U. S. Pipe & Foundry
U7 Ulbrich Stainless Steels
U8 U. S. Steel Supply Div. U. S. Steel Corp.

V2 Vanadium-Alloys Steel
V3 Vulcan Crucible Div., H. K. Porter Co. Inc.

W1 Wallace Barnes Co.
W2 Wallingford Steel Co.
W3 Washburn Wire Co.
W4 Washington Steel Corp.
W6 Weirton Steel Co.
W7 W. Va. Steel & Mfg. Co.
W8 Western Automatic Machine Screw Co.
W9 Wheatland Tube Co.
W10 Wheeling Steel Corp.
W12 Wickwire Spencer Steel Div., Colo. Fuel & Iron
W13 Wilson Steel & Wire Co.
W14 Wisconsin Steel Div., International Harvester
W15 Woodward Iron Co.
W18 Wyckoff Steel Co.
W19 Worcester Pressed Steel

Y1 Youngstown Sheet&Tube

STRIP

STRIP, Hot-Rolled Carbon

Ala.City,Ala.(27) R2	4.325
Allenport,Pa. P7	4.325
Alton,Ill. L1	4.50
Ashland,Ky.(8) A10	4.325
Atlanta A11	4.525
Bessemer,Ala. T2	4.325
Birmingham C15	4.825
Bridgeport,Conn. N19	4.625
Buffalo(27) R2	4.325
Conshohocken,Pa. A3	4.375
Detroit M1	4.425
Ecorse,Mich. G5	4.425
Fairfield,Ala. T2	4.325
Fontana,Calif. K1	5.125
Gary,Ind. U5	4.325
Ind.Harbor,Ind. I-2,Y1	4.325
Johnstown,Pa.(25) B2	4.325
Lackaw'na,N.Y.(24) B2	4.325
LosAngeles (25) B3	5.075
Milton,Pa. M18	4.325
Minnequa,Colo. C10	5.425
Pittsburg,Calif. C11	5.075
Riverdale,Ill. A1	4.55
SanFrancisco S7	5.05
Seattle(25) B3	5.325
Seattle N14	5.40
Sharon,Pa. S3	4.325
S.Chicago,Ill. W14	4.325
S.SanFrancisco(25) B3	5.075
SparrowsPoint,Md. B2	4.325
Sterling(1) N15	4.325
Sterling Ill. N15	4.425
Torrance,Calif. C11	5.075
Warren,O. R2	4.325
Weirton,W.Va. W6	4.325
Youngstown U5	4.325

High-Strength Low-Alloy

Bridgeport,Conn. N19	7.50
Carnegie,Pa. S18	7.20
Fontana,Calif. K1	8.95
Gary Ind. U5	7.20
Ind.Harbor,Ind. Y1	7.20
LosAngeles B3	8.40
Newport,Ky. N9	7.20
Sharon,Pa. S3	7.20
S.Chicago W14	7.20
Youngstown U5, Y1	7.20

STRIP, Hot-Rolled High-Strength Low-Alloy

Bessemer,Ala. T2	6.425
Conshohocken,Pa. A3	*6.925*
Ecorse,Mich. G5	6.525
Fairfield,Ala. T2	6.425
Fontana,Calif. K1	7.575
Gary,Ind. U5	6.425
Houston S5	6.675
Ind.Harbor Ind. I-2,Y1	6.425
KansasCity,Mo. S5	6.675
Lackawanna,N.Y. B2	6.425
LosAngeles(25) B3	7.175
Seattle(25) B3	7.425
Sharon,Pa. S3	6.425
S.SanFrancisco(25) B3	7.175
SparrowsPoint,Md. B2	6.425
Warren,O. R2	6.425
Weirton,W.Va. W6	6.425
Youngstown U5, Y1	6.425

STRIP, Hot-Rolled Ingot Iron

Ashland,Ky.(8) A10	4.575

STRIP, Cold-Rolled Carbon

Anderson,Ind. G6	6.25
Baltimore T6	6.25
Buston T6	6.80
Buffalo S40	6.25
Cleveland A7, J5	6.25
Conshohocken,Pa. A3	*6.70*
Dearborn,Mich. D3	6.35
Detroit D2, M1, P20	6.35
Dover,O. G6	6.25
Ecorse,Mich. G5	6.35
Follansbee,W.Va. F4	6.25
Fontana,Calif. K1	8.00
FranklinPark,Ill. T6	6.35
Ind.Harbor,Ind. I-2	6.35
Ind.Harbor,Ind. Y-1	6.25
Indianapolis C8	6.40
Lackawanna,N.Y. B2	6.25
LosAngeles C1	8.30
NewBedford,Mass. R10	6.70
NewBritain(10) S15	6.25
NewCastle,Pa. B4, E5	6.25
NewHaven,Conn. A7 D2	6.70
NewKensington,Pa. A6	6.25
Pawtucket,R.I. R3	6.90
Pawtucket,R.I. N8	6.80
Pittsburgh J5	6.25
Riverdale,Ill. A1	6.35
Rome,N.Y. (32) R6	6.25
Sharon,Pa. S3	6.25
SparrowsPt.,Md. B2	6.25
Trenton,N.J.(31) R5	7.50
Wallingford,Conn. W2	6.70
Warren,O. R2 T5	6.25
Weirton,W.Va. W6	6.25
Worcester,Mass. A7	6.80
Youngstown C8, Y1	6.25

STRIP, Cold-Rolled Alloy

Boston T6	13.80
Carnegie,Pa. S18	13.45
Cleveland A7	13.45
Dover,O. G6	13.45
FranklinPark,Ill. T6	13.45
Harrison,N.J. C18	13.45
Indianapolis C8	13.60
Pawtucket,R.I. N8	13.80
Sharon,Pa. S3	13.45
Worcester,Mass. A7	13.75
Youngstown C8	13.45

STRIP, Cold-Rolled High-Strength, Low-Alloy

Cleveland A7	9.10
Dearborn,Mich. D3	9.20
Dover,O. G6	9.30
Ecorse,Mich. G5	9.20
Ind.Harbor,Ind. Y1	9.30

STRIP, Cold-Finished Spring Steel (Annealed)	0.26-0.40C	0.41-0.60C	0.61-0.80C	0.81-1.05C	1.06-1.35C
Baltimore T6	7.40	9.35	10.90	13.05	15.75
Buston T6	7.65	9.35	10.90	13.05	15.75
Bristol,Conn. W1	...	...	10.90	13.05	15.75
Carnegie,Pa. S18	...	9.05	10.60	12.75	....
Cleveland A7	7.10	9.05	10.60	12.75	15.45
Cleveland C7	...	9.05	10.60	12.75	15.45
Dearborn,Mich. D3	7.20	9.15	10.70	....	....
Detroit D2	7.20	9.15	10.70	12.85	....
Dover,O. G6	7.10	9.05	10.60	12.75	15.45
FranklinPark,Ill. T6	7.20	9.05	10.60	12.75	15.45
Harrison,N.J. C18	...	...	10.90	13.05	15.75
Indianapolis C8	7.25	9.20	10.60	12.75	15.45
NewBritain,Conn.(10) S15	7.10	9.05	10.60	12.75	15.45
NewCastle,Pa. B4, E5	7.10	9.05	10.60	12.75	....
NewHaven,Conn. D2	7.55	9.35	10.90	13.05	....
NewKensington,Pa. A6	7.10	9.05	10.60	....	....
NewYork W3	...	9.35	10.90	13.05	15.75
Pawtucket,R.I. N8	7.65	9.35	10.90	13.05	15.75
Riverdale,Ill. A1	7.20	9.05	10.60	12.75	15.45
Rome,N.Y.(32) R6	7.10	9.05	10.60	12.75	15.45
Sharon,Pa. S3	7.10	9.05	10.60	12.75	15.45
Trenton,N.J. R5	...	9.35	10.90	13.05	15.75
Wallingford,Conn. W2	7.55	9.35	10.90	13.05	15.75
Warren,O. T5	7.10	9.05	10.60	12.75	15.45
Weirton,W.Va. W6	7.10	9.05	10.60	12.75	15.45
Worcester,Mass. A7, T6	7.65	9.35	10.90	13.05	15.75
Youngstown C8	7.10	9.05	10.60	12.75	15.45
Spring Steel (Tempered)					
Bristol,Conn. W1	....	....	14.80	18.15	....
Buffalo W12	....	....	14.80	....	....
FranklinPark,Ill. T6	....	....	15.15	18.50	22.35
Harrison,N.J. C18	....	....	14.80	18.15	22.00
NewYork W3	....	....	14.80	18.15	22.00
Trenton,N.J. R5	....	....	14.80	18.15	22.00
Worcester,Mass. W12	....	....	14.80	....	....
Worcester,Mass. A7, T6	....	....	14.80	18.15	22.00
Youngstown C8	....	....	15.15	18.50	22.35

STRIP, Electrogalvanized

Cleveland A7	6.25*
Dover,O. G6	6.25*
Riverdale,Ill. A1	6.35*
Warren,O. B9, T5	6.25*
Worcester,Mass. A7	6.80*
Youngstown C8	6.25*

*Plus galvanizing extras.

STRIP, Galvanized (Continuous)

Sharon,Pa. S3	6.55

TIGHT COOPERAGE HOOP

Atlanta A11	5.05
Riverdale,Ill. A1	4.90
Sharon,Pa. S3	4.75
Youngstown U5	4.75

SILICON STEEL

H.R. SHEETS(22 Ga.,cut lengths)	Field	Armature	Electric	Motor	Dynamo
BeechBottom,W.Va. W10	....	....	9.95	10.95	11.85
Brackenridge,Pa. A4	....	....	9.95	10.95	11.85
Mansfield,O. E6	8.40	9.35	9.95	10.95	11.85
Newport,Ky. N9	8.40	9.35	9.95	10.95	11.85
Niles,O. M21	8.40	9.35	9.95	10.95	....
Vandergrift,Pa. U5	....	9.35	9.95	10.95	11.85
Warren,O. R2	8.40	9.35	9.95	10.95	11.85
Zanesville,O. A10	....	9.35	9.95	10.95	11.85

C.R. COILS & CUT LENGTHS, (22 Ga.) Fully Processed (Semiprocessed ½¢ lower)	Field	Armature	Electric	Motor	Dynamo
Brackenridge,Pa. A4	....	....	10.70	11.70	12.60
GraniteCity,Ill. G4	8.80*	9.80*	10.40*	11.40*	....
IndianaHarbor,Ind. I-2	8.60†	9.60*	10.20*	11.20*	....
Vandergrift,Pa. U5	8.60*	9.60*	10.20*	11.20*	12.10*
Vandergrift,Pa. U5	....	10.10†	10.70†	11.70†	12.60†
Warren,O. R2	8.60†	10.10	10.70	11.70	12.60

H.R. SHEETS (22 Ga., cut lengths)	Transformer Grade T-72	T-65	T-58	T-52
BeechBottom,W.Va. W10	12.80	13.35	13.85	14.85
Brackenridge,Pa. A4	12.80	....	....	....
Newport,Ky. N9	12.80	....	....	....
Vandergrift,Pa. U5	12.80	13.35	13.85	14.85
Zanesville,O. A10	12.80‡	13.35‡	13.85‡	14.85‡

C.R. COILS & CUT LENGTHS (22 Ga.)	Grain Oriented T-100	T-90	T-80	T-73	T-66	T-72
Brackenridge,Pa. A4	15.85	15.85	17.45	17.95	18.45	13.55**
Butler,Pa. A10	....	....	17.45	17.95	....	....
Vandergrift,Pa. U5	14.85	15.85	17.45	17.95	....	13.55
Warren,O. R2	....	....	....	....	....	13.55‡

*Semiprocessed. †Fully processed only. ‡Coils, annealed, semiprocessed ½c lower. §Coils, ¾-cent higher. **Cut lengths, ¾-cent lower.

TIN MILL PRODUCTS

TIN PLATE Electrolytic (Base Box)	0.25 lb	0.50 lb	0.75 lb
Aliquippa,Pa. J5	$8.30	$8.55	$8.95
Dravosburg,Pa. U5	8.30	8.55	8.95
Fairfield,Ala. T2	8.40	8.65	9.05
Fontana,Calif. K1	9.05	9.30	9.70
Fairless Pa. U5	8.40	8.65	9.05
Gary,Ind. U5	8.30	8.55	8.95
GraniteCity,Ill. G4	8.40	8.65	9.05
IndianaHarbor,Ind. I-2, Y1	8.30	8.55	8.95
Niles,O. R2	8.30	8.55	8.95
Pittsburg,Calif. C11	9.05	9.30	9.70
SparrowsPoint,Md. B2	8.40	8.65	9.05
Weirton W.Va. W6	8.30	8.55	8.95
Yorkville,O. W10	8.30	8.55	8.95

ELECTROTIN (22-27 Gage; Dollars per 100 lb)			
Aliquippa,Pa. J5	6.975	....	....
Niles,O. R2	6.975	7.175	7.375

TINPLATE, American	1.25 lb	1.50 lb
Aliquippa,Pa. J5	$9.60	$9.85
Dravosburg,Pa. U5	9.60	9.85
Fairfield,Ala. T2	9.70	9.95
Fairless Pa. U5,	9.70	9.95
Fontana,Calif. K1	10.35	10.60
Gary,Ind. U5	9.60	9.85
Ind.Har. I-2, Y1	9.60	9.85
Pitts.,Calif. C11	10.35	10.60
Sp.Pt.,Md. B2	9.70	9.95
Weirton,W.Va. W6	9.60	9.85
Yorkville,O. W10	9.60	9.85

BLACK PLATE (Base Box)	
Aliquippa,Pa. J5	$7.40
Dravosburg,Pa. U5	7.40
Fairfield,Ala. T2	7.50
Fairless Pa. U5	7.50
Fontana,Calif. K1	8.15
Gary Ind. U5	7.40
GraniteCity,Ill. G4	7.50
Ind.Harbor,Ind. I-2, Y1	7.40
Niles,O. R2	7.40
Pittsburg,Calif. C11	8.15
SparrowsPoint,Md. B2	7.50
Warren,O. R2	7.40
Weirton,W.Va. W6	7.40
Yorkville,O. W10	7.40

HOLLOWARE ENAMELING Black Plate (29 Gage)

Dravosburg,Pa. U5	6.65
Gary,Ind. U5	6.65
GraniteCity,Ill. G4	6.75
Ind.Harbor,Ind. Y1	6.65
Yorkville,O. W10	6.65

MANUFACTURING TERNES (Special Coated; Base Box)

Dravosburg,Pa. U5	$9.10
Gary,Ind. U5	9.10
Yorkville,O. W10	9.10

MANUFACTURING TERNES (Light Coated, 6 lb; Base Box)

Yorkville O. W10	$9.55

ROOFING SHORT TERNES (8 lb Coated; Base Box)

Gary,Ind. U5	$10.65

WIRE

WIRE, Manufacturers Bright, Low Carbon

AlabamaCity,Ala. R2	6.60
Aliquippa,Pa. J5	6.60
Alton,Ill. L1	6.775
Atlanta A11	6.80
Bartonville,Ill. K4	6.70
Buffalo W12	6.60
Chicago W13	6.60
Cleveland A7	6.60
Crawfordsville,Ind. M8	6.70
Donora,Pa. A7	6.60
Duluth,Minn. A7	6.60
Fairfield,Ala. T2	6.60
Fostoria,O.(24) S1	6.80
Houston S5	6.85
Jacksonville,Fla. M8	6.95
Johnstown,Pa. B2	6.60
Joliet,Ill. A7	6.60
KansasCity,Mo. S5	6.85
Kokomo,Ind. C18	6.70
LosAngeles B3	7.55
Minnequa,Colo. C10	6.85
Monessen,Pa. P7	6.60
Newark 6-8 ga. I-1	6.90
N.Tonawanda B11	6.60
Palmer,Mass. W12	6.90
Pittsburg,Calif. C11	7.55
Portsmouth,O. P12	6.60
Rankin,Pa. A7	6.60
S.Chicago Ill. R2	6.60
S.SanFrancisco C10	7.55
SparrowsPoint,Md. B2	6.70
Sterling,Ill.(1) N15	6.60
Sterling,Ill. N15	6.70
Struthers,O. Y1	6.60
Waukegan Ill. A7	6.60
Worcester,Mass. A7	6.90

WIRE, MB Spring, High Carbon

Aliquippa,Pa. J5	7.90
Alton,Ill. L1	8.075
Bartonville,Ill. K4	8.00
Buffalo W12	7.90
Cleveland A7	7.90
Donora,Pa. A7	7.90
Duluth Minn. A7	7.90
Fostoria,O. S1	7.95
Johnstown,Pa. B2	7.90
LosAngeles B3	8.85
Milbury,Mass.(12) N6	8.20
Minnequa,Colo. C10	8.15
Monessen,Pa. P7, P16	7.90
Muncie Ind. I-7	8.10
Palmer,Mass. W12	8.20
Pittsburg Calif. C11	8.85
Portsmouth,O. P12	7.90
Roebling,N.J. R5	8.20
S.Chicago,Ill. R2	7.90
S.SanFrancisco C10	8.85
SparrowsPt.,Md. B2	8.00
Struthers,O. Y1	7.90
Trenton,N.J. A7	8.20
Waukegan,Ill. A7	7.90
Worcester A7,J4,T6,W12	8.20

WIRE, Upholstery Spring

Aliquippa,Pa. J5	7.60
Alton,Ill. L1	7.775
Buffalo W12	7.60
Cleveland A7	7.60
Donora,Pa. A7	7.60
Duluth,Minn. A7	7.60
Johnstown,Pa. B2	7.60
KansasCity,Mo. S5	7.85
LosAngeles B3	8.55
Minnequa,Colo. C10	7.775
Monessen Pa. P7, P16	7.60
NewHaven,Conn. A7	7.90
Palmer,Mass. W12	7.90
Pittsburg,Calif. C11	8.55
Portsmouth,O. P12	7.60
Roebling,N.J. R5	7.90
S.Chicago,Ill. R2	7.60
S.SanFrancisco C10	8.55
SparrowsPoint,Md. B2	7.70
Struthers O. Y1	7.60
Trenton,N.J. A7	7.90
Waukegan,Ill. A7	7.60
Worcester,Mass. A7	7.90

WIRE, Fine & Weaving (8"Coils)

Alton,Ill. L1	12.725
Bartonville,Ill. K4	12.65
Buffalo W12	12.55
Chicago W13	12.55
Cleveland A7	12.55
Crawfordsville,Ind. M8	12.65
Fostoria,O. S1	12.55
Jacksonville,Fla. M8	12.90
Johnstown,Pa. B2	12.55
Kokomo,Ind. C16	12.55
Minnequa,Colo. C10	12.30
Monessen Pa. P6	12.55
Muncie Ind. I-7	12.75
Palmer,Mass. W12	12.85
Roebling,N.J. R5	12.85
S.SanFrancisco C10	12.90
Waukegan,Ill. A7	12.55
Worcester,Mass. A7,T6	12.85

WIRE, Gal'd AC5R for Cores

Bartonville,Ill. K4	10.70
Buffalo W12	10.70
Johnstown,Pa. B2	10.70
Minnequa,Colo. C10	10.825
Monessen,Pa. P16	10.70
Muncie,Ind. I-7	10.90
Palmer,Mass. W12	11.00
Pittsburg,Calif. C11	11.50
Portsmouth,O. P12	10.70
Roebling,N.J. R5	11.00
SparrowsPt.,Md. B2	10.80
Struthers,O. Y1	10.70

ROPE WIRE (A)

Bartonville,Ill. K4	10.55
Buffalo W12	10.55
Fostoria,O. S1	10.55
Johnstown Pa. B2	10.55
Monessen Pa. P7, P16	10.55
Muncie,Ind. I-7	10.75
Palmer,Mass. W12	10.55
Portsmouth,O. P12	10.55
Roebling,N.J. R5	10.85
SparrowsPt. B2	10.65
Struthers,O. Y1	10.55
Worcester,Mass. J4	10.85

(A) Plow and Mild Plow; add 0.25c for Improved Plow.

WIRE
(Continued)

WIRE, Tire Bead
Bartonville,Ill. K4 ....14.15
Monessen,Pa. P16 .....14.20
Roebling,N.J. R5 .....14.35

WIRE, Cold-Rolled Flat
Anderson,Ind. G6 ....9.50
Baltimore T6 .....9.50
Boston T6 .....9.50
Buffalo W12 .....9.50
Cleveland A7 .....9.50
Crawfordsville,Ind. M8 . 9.50
Dover,O. G6 .....9.50
Fostoria,O. S1 .....9.50
FranklinPark,Ill. T6 ...9.60
Kokomo,Ind. C16 .....9.50
Massillon,O. R5 .....9.50
Milwaukee C23 .....9.70
Monessen,Pa. P7, P16..9.50
Pawtucket,R.I. N8 ....9.80
Riverdale,Ill. A1 .....9.60
Rome,N.Y. R6 .....9.50
Trenton,N.J. R5 .....9.80
Worcester A7, T6, W12.9.80

NAIL, Stock
To Dealers & Mfrs. (7) Col.
AlabamaCity,Ala. R2 ...152
Aliquippa,Pa. J5 152
Atlanta A11 154
Bartonville,Ill. K4 154
Chicago,Ill W13 152
Cleveland A9 157
Crawfordsville,Ind. M8 ..154
Donora,Pa. A7 152
Duluth,Minn. A7 152
Fairfield,Ala. T2 152
Galveston,Tex. D7 157
Houston,Tex. S5 157
Jack'ville,Fla.(20) M8 ..163
Johnstown,Pa. B2 152
Joliet,Ill. A7 152
KansasCity,Mo. S5 157
Kokomo,Ind. C16 154
Minnequa,Colo. C10 157
Monessen,Pa. P7 152
Pittsburg,Calif. C11 171
Rankin,Pa. A7 152
S.Chicago,Ill. R2 152
SparrowsPt.,Md. B2 154
Sterling,Ill.(1) N15 152
Worcester,Mass. A7 158

NAILS, Cut (100 lb keg)
To Dealers (33)
Conshohocken,Pa. A3 ..$9.05
Wheeling,W.Va. W10 ...9.05

STAPLES, Polished Stock
To Dealers & Mfrs. (7) Col.
AlabamaCity,Ala. R2 ...157
Aliquippa,Pa. J5 152
Atlanta A11 154
Bartonville,Ill. K4 154
Crawfordsville,Ind. M8 ..154
Donora,Pa. A7 152
Duluth,Minn. A7 152
Fairfield,Ala. T2 152
Jack'ville,Fla.(20) M8 ..163
Johnstown,Pa. B2 152
Joliet,Ill. A7 152
Kokomo,Ind. C16 154
Minnequa,Colo. C10 157
Monessen,Pa. P7 152
Pittsburg,Calif. C11 171
Rankin,Pa. A7 152
S.Chicago,Ill. R2 152
SparrowsPt.,Md. B2 154
Sterling,Ill.(1) N15 152
Worcester,Mass. A7 158

TIE WIRE, Automatic Baler (14½ Ga.)(Per 97 lb Net Box)
Coil No. 3150
AlabamaCity,Ala. R2 ..$9.45
Bartonville,Ill. K4 .....9.45
Buffalo W12 .....9.45
Crawfordsville,Ind. M8 ..9.55
Donora,Pa. A7 .....9.45
Duluth,Minn. A7 .....9.45
Jacksonville,Fla. M8 ....10.01
Johnstown,Pa. B2 .....9.45
Joliet,Ill. A7 .....9.45
Kokomo,Ind. C16 .....9.55
LosAngeles B3 .....10.24
Minnequa,Colo. C10 .....9.60
Pittsburg,Calif. C11 ....10.23
S.Chicago,Ill. R2 .....9.45
SparrowsPt.,Md. B2 ....9.55
Sterling,Ill. N15 .....9.35

Coil No. 6500 Stand.
AlabamaCity,Ala. R2 ..$9.75
Bartonville,Ill. K4 .....9.75
Buffalo W12 .....9.75
Crawfordsville,Ind. M8 ..9.85
Donora,Pa. A7 .....9.75
Duluth,Minn. A7 .....9.75
Jacksonville,Fla. M8 ....10.31
Johnstown,Pa. B2 .....9.75
Joliet,Ill. A7 .....9.75
Kokomo,Ind. C16 .....9.85
LosAngeles B3 .....10.55
Minnequa,Colo. C10 .....9.90
Pittsburg,Calif. C11 ....10.55
S.Chicago,Ill. R2 .....9.75
SparrowsPt.,Md. B2 ....9.85
Sterling,Ill. N15 .....9.65

Coil No. 6500 Interim
AlabamaCity,Ala. R2 ..$9.80
Bartonville,Ill. K4 .....9.80
Buffalo W12 .....9.80
Crawfordsville,Ind. M8 ..9.90
Donora,Pa. A7 .....9.80
Duluth,Minn. A7 .....9.80
Jacksonville,Fla. M8 ...10.36
Johnstown,Pa. B2 .....9.80
Joliet,Ill. A7 .....9.80
Kokomo,Ind. C16 .....9.90
LosAngeles B3 .....10.66
Minnequa,Colo. C10 .....9.95
Pittsburg,Calif. C11 ....10.60
S.Chicago,Ill. R2 .....9.80
SparrowsPt.,Md. B2 .....9.90
Sterling,Ill. N15 .....9.70

WIRE, Barbed **Col.**
AlabamaCity,Ala. R2 ..175°°
Aliquippa,Pa. J5 .....172‖
Atlanta A11 181
Bartonville,Ill. K4 181
Crawfordsville,Ind. M8 . 181
Donora,Pa. A7 .....175†
Duluth,Minn. A7 .....175†
Fairfield,Ala. T2 .....175†
Houston,Tex. S5 .....180°°
Jacksonville,Fla. M8 ...186
Johnstown,Pa. B2 .....179°
Joliet,Ill. A7 .....175†
KansasCity,Mo. S5 ....180°°
Kokomo,Ind. C16 .....177†
Minnequa,Colo. C10 ....180°°
Monessen,Pa. P7 .....178††
Pittsburg,Calif. C11 ....195†
Rankin,Pa. A7 .....175†
S.Chicago,Ill. R2 .....175°°
S.SanFrancisco C10 ....195°°
SparrowsPoint,Md. B2 ..181°
Sterling,Ill.(1) N15 ...179††

WOVEN FENCE, 9-15 Ga. **Col.**
Ala.City,Ala. R2 .....162°°
Aliq'ppa,Pa.9-14½ga.J5 165‖
Atlanta A11 168
Bartonville,Ill. K4 168
Crawfordsville,Ind. M8 . 168
Donora,Pa. A7 .....162†
Duluth,Minn. A7 .....162†
Fairfield,Ala. T2 .....162†
Houston,Tex. S5 .....167°°
Jacksonville,Fla. M8 173
Johnstown,Pa.(43) B2 ..168
Joliet,Ill. A7 .....162†
KansasCity,Mo. S5 ....167°°
Kokomo,Ind. C16 .....164††
Minnequa,Colo. C10 ....167°°
Monessen,Pa. 9 ga. P7.166††
Pittsburg,Calif. C11 ....185†
Rankin,Pa. A7 .....162†
S.Chicago,Ill. R2 .....162°°
Sterling,Ill.(1) N15 ...166††

An'ld Galv.
WIRE (16 Gage) Stone Stone
Ala.City R2 ...14.50 16.05°°
Bartonville K4 ..14.50 16.55
Buffalo W12 ....14.50 ....
Cleveland A7 ....14.50 ....
Crawf'dsville M8.14.60 16.55
Fostoria,O. S1 ..14.60 16.15†
Jacksonville M8..14.85 16.80
Johnstown B2 ..14.50 16.40°
Kokomo C16 ....14.60 16.15†
Minnequa C10..14.75 16.45°°
Palmer,MassW12 14.50 16.05°
Pitts.,Calif. C11 14.85 16.40†
S.Chicago R2..14.50 16.05°°
SparrowsPt. B2..14.60 16.50°
Sterling(1) N15.14.50 16.45††
Waukegan A7 ..14.50 16.05
Worcester A7 ...14.80 ....

WIRE, Merchant Quality (6 to 8 gage) **An'ld Galv.**
Ala.City,Ala. R2..7.50 7.90°°
Aliquippa J5 ....7.40 7.925‖
Atlanta A11 .....7.60 8.20
Bartonville(48) K4 7.60 8.20
Buffalo W12 .....7.50 7.90†
Cleveland A7 .....7.50 ....
Crawfordsville M8.7.60 8.20
Donora,Pa. A7 ...7.50 7.90†
Duluth,Minn. A7..7.50 7.90†
Fairfield T2 .....7.50 7.90†
Houston(48) S5..7.65 8.05°°
Jacks'ville,Fla. M8 7.85 8.45
Johnstown B2(48) 7.50 8.10°
Joliet,Ill. A7 .....7.50 7.90†
Kans.City(48) S5.7.65 8.05°°
Kokomo C16 .....7.60 8.00†
LosAngeles B3 ...8.45 9.05°
Minnequa C10 ...7.65 8.05°°
Monessen P7(48)..7.40 8.00††
Palmer,Mass. W12.7.50 8.20†
Pitts.,Calif. C11 ..8.45 8.85†
Portsmouth,O. P12.7.50 ....
Rankin A7 .....7.50 7.90†
S.Chicago R2 ....7.50 7.90°°
S.SanFran. C10 ..8.35 8.75°°
Spar'wsPt. B2(48) 7.60 8.20°
Str'ling(1)(48)N15 7.40 8.00††
Struth'rs,O(48) Y1 7.50 8.00‡
Worcester,Mass.A7 7.80 8.20†
Based on zinc price of: °13.50c. †5c. ‖10c. ‡Less than 10c. ††13c. °°Subject to zinc equalization extras.

FASTENERS

(Base discounts, full case quantity, per cent off list to consumer, f.o.b. mill)

Carriage, Machine Bolts
Full-Size Body (cut thread)
1⅛" x 6" and smaller 61
Larger than ½" diam. and all diams. longer than 6" 55
Under-Size Body (rolled thread; not nutted):
⅝" x 6" and smaller. 61

†1⅛" x 4" and smaller and shorter are not nutted.

NUTS
Reg. & Heavy Square Nuts:
All sizes 61
H.P. Reg. & Heavy Hex Nuts:
⅝" & smaller 64
⅞" to 1⅛" incl. 63
1¼" to 1½" incl. 65
1⅝" & larger 61
C.P. Reg. & Heavy Hex Nuts
⅝" & smaller 64
⅞" & larger 61
Semifinished & Finished Nuts
⅝" & smaller..... 66
⅞" & larger 63
Semifinished Slotted Reg. & Heavy Hex Nuts
⅝" & smaller 66
⅞" & larger 63
Hot Galvanized Nuts, all types
1½" & smaller 44
(On above items, add 25% for less than case quantities)

CAP SCREWS
(New Std., hexagon head, upset, packages)

Bright:
6" and shorter:
¼" through ½" diam. 34
⅝" & ⅝" diam. 31
⅞", ⅞", 1" 8
Longer than 6":
¼" through ⅝" diam. 3
⅞" through 1" diam. +13
High Carbon, Heat-treated:
6" and shorter:
¼" through ½" diam. 20
⅝" & ⅝" diam. 16
⅞", ⅞", 1" .....+11
Longer than 6":
¼" through ⅝" diam. +23
⅞" through 1" diam. +41
(New Std. Hexagon head, upset, bulk)
Bright:
½" x 6" & smaller & shorter 49
⅝", ¾", ⅞" diam. x 6" & shorter 48
⅞", ⅞", 1" x 6" & shorter 31
High Carbon, Heat-treated:
½" x 6" & smaller & shorter 41
⅝" x ⅞" diam. & 6" & shorter 39
⅞", ⅞", 1" x 6" & shorter 29

MACHINE SCREW NUTS & STOVE BOLT NUTS (Bulk)
No. 2 to ⅜" incl., Square:
25,000 to 199,999 pieces 20
200,000 or more pieces 27
No. 2 to ⅜" incl., Hex.:
25,000 to 199,999 pieces 18
200,000 or more pieces 25

MACHINE SCREWS, SLOTTED (Bulk)
No. 2 to ¼" diam. incl.:
25,000 to 199,999 pieces 20
200,000 or more pieces 27
⅜" to ½" diam. incl.:
15,000 to 99,999 pieces 20
100,000 or more 27

BOILER TUBES

Net base c.l. prices, dollars per 100 ft, mill; minimum wall thickness, cut lengths 10 to 24 ft, inclusive.

O.D. In.	B.W. Gage	Seamless H.R.	Seamless C.D.	Elec. Weld H.R.
1	13	....	21.55	20.90
1¼	13	....	25.53	21.25
1½	13	24.24	28.22	23.50
1¾	13	28.63	33.34	27.76
2	13	32.09	37.37	31.13
2¼	13	36.14	42.09	35.05
2¼	12	39.23	45.67	38.05
2½	12	43.23	50.31	41.91
2¾	12	46.79	54.48	45.38
3	12	49.90	58.10	48.39

RAILWAY MATERIALS

	Standard No. 1	Standard No. 2	Tee Rails All No. 2	Tee Rails 60 lb Under
RAILS				
Bessemer,Pa. U5	4.725	4.625	4.675	5.65
Ensley,Ala. T2	4.725	4.625	....	5.65
Fairfield,Ala. T2	....	....	....	5.65
Gary,Ind. U5	4.725	4.625	4.675	....
Huntington,W.Va. W7	....	....	....	5.65
IndianaHarbor,Ind. I-2	4.725	4.625	4.675	....
Johnstown,Pa. B2	....	....	....(16)5.65	
Lackawanna,N.Y. B2	4.725	4.625	....(16)5.65	
Minnequa,Colo. C10	4.725	4.625	....	6.15
Steelton,Pa. B2	4.725	4.625	....	....
Williamsport,Pa. S19	....	....	....	5.65

TIE PLATES
Fairfield,Ala. T2 ....5.625
Gary,Ind. U5 .....5.625
Ind.Harbor,Ind. I-2 ..5.625
Lackawanna,N.Y. B2..5.625
Minnequa,Colo. C10 ..5.625
Seattle B3 .....5.775
Steelton,Pa. B2 .....5.625
Torrance,Calif. C11 ...5.775

TRACK BOLTS, Untreated
Cleveland R2 .....12.15
KansasCity,Mo S5 ...12.90*
Lebanon,Pa. B2 .....12.15
Minnequa,Colo. C10 ...12.15
Pittsburgh O3, P14 ...12.15
Seattle B3 .....12.65

*Treated

AXLES
Ind.Harbor,Ind. S13 ...7.50
Johnstown,Pa. B2 .....7.50

JOINT BARS
Bessemer,Pa. U5 .....5.825
Fairfield,Ala. T2 .....5.825
Ind.Harbor,Ind. I-2....5.825
Joliet,Ill. U5 .....5.825
Lackawanna,N.Y. B2 ..5.825
Minnequa,Colo. C10 ...5.825
Steelton,Pa. B2 .....5.825

SCREW SPIKES
Cleveland R2 .....11.90
Pittsburgh O3 .....11.90

STANDARD TRACK SPIKES
Fairfield,Ala. T2 .....8.05
Ind.Harbor,Ind. Y1 ....8.05
Ind.Harbor,Ind. I-2 ....7.90
KansasCity,Mo. S5 ....7.90
Lebanon,Pa. B2 .....8.05
Minnequa,Colo. C10 ....7.90
Pittsburgh J5 .....8.05
Seattle B3 .....8.55
S.Chicago,Ill. R2 .....8.05
Struthers,O. Y1 .....8.05
Youngstown R2 .....8.05

METAL POWDER

(Per pound f.o.b. shipping point in ton lots for minus 100 mesh, except as noted)

Sponge Iron: Cents
Swedish, c.i.f., Camden, N.J., c.l. tin bags... 8.50
Domestic:
F.o.b. Johnstown, Pa., Niagara Falls, N. Y., in bags.... 9.50
F.o.b. Riverton, N. J., in bags 8.50
Canadian, f.o.b. shipping point 9.50
Electrolytic iron:
Melting stock, 99.9% Fe, irregular fragments of ⅛ in. x 1.3 in. 22.00
Annealed, 99.5% Fe. 36.50
Unannealed (99+% Fe) 34.00
Unannealed (99+% Fe) (minus 325 mesh) 57.00
Powder Flakes (minus 16, plus 100 mesh).. 31.00
Carbonyl Iron:
98.1-99.9%, 3 to 20 microns, depending on grade, $6.00-275.00, in standard 200-lb containers; all minus 200 mesh.
Aluminum:
Atomized, 500 lb, drum frght. allowed
Carlots 36.00
Ton lots 38.00
Antimony, 500 lb lots 32.00*
Brass, 5000-lb lots .....41.75-65.25†
Bronze, 5000-lb lots .....67.50-71.75†
Copper:
Electrolytic 14.25*
Reduced 14.25*
Lead 7.50*
Manganese:
Minus 35 mesh 64.00
Minus 100 mesh 70.00
Minus 200 mesh 75.00
Nickel,unannealed ... $1.00
Nickel-Silver, 5000-lb lots .....62.75-65.25†
Phosphor-Copper, 5000-lb lots 68.75
Silicon 47.50
Solder 7.00*
Stainless Steel, 302 .. 99.00
Stainless Steel, 316 .. $1.32
Tin 14.50*
Zinc 5000-lb lots 19.25-33.00‡
Tungsten Dollars
Melting grade, 99% 50 to 200 mesh:
1000 lb and over .. 4.50
Less than 1000 lb... 4.65
Chromium, electrolytic 99.8% Cr min. metallic basis 5.00

*Plus cost of metal. †Depending on composition. ‡Depending on mesh. ‖70% Cu, 20% Zn, 10% Ni. **64% Cu, 18% Zn, 18% Ni.

Footnotes

(1) Chicago base.
(2) Angles, flats, bands.
(3) Merchant.
(4) Reinforcing.
(5) 1¼-in. to less than 1 7/16-in.
(6) Chicago or Birm. base.
(7) To jobbers, 3 cols. lower.
(8) 16 Ga. and heavier.
(9) Merchant quality; add 0.35c for special quality.
(10) Pittsburgh base.
(11) Cleveland & Pitts. base.
(12) Worcester, Mass., base.
(13) Add 0.25c for 17 Ga. & heavier.
(14) Gage 0.143 to 0.249 in.; for gage 0.142 and lighter, 5.80c.
(15) ¾" and thinner.
(16) 40 lb and under.
(17) Flats only; 0.25 in. & heavier.
(18) To dealers.
(19) Chicago & Pitts. base.
(20) Plus 1c per 100 lb.
(21) New Haven, Conn., base.
(22) Ded. San Francisco Bay area.
(24) Deduct 0.10c, finer than 15 Ga.
(25) Bar mill bands.
(26) Delivered in mill zone, 5.25c.
(27) Bar mill sizes.
(28) Bonderized.
(29) Youngstown base.
(30) Sheared; for universal mill add 0.45c.
(31) Widths over ⅝ in.; 6.95c for widths ⅝ in. and under by 0.125 in. and thinner.
(32) Buffalo base.
(33) To jobbers, deduct 20c.
(34) 9.60c for cut lengths.
(35) 72" and narrower.
(36) 54" and narrower.
(37) 13 Ga. & heavier; 60" & narrower.
(38) 14 Ga. & Lighter; 48" & narrower.
(39) 48" and narrower.
(40) Lighter than 0.035"; 0.035" and heavier, 0.25c higher.
(41) 9.10c for cut lengths.
(42) Mill lengths, f.o.b. mill; ded. in mill zone or within switching limits, 5.25c.
(43) 9-14½ Ga.
(45) 6-7 Ga.
(49) 2½-in. and smaller rounds; 7.95c over 2½-in. and other shapes.

SEAMLESS STANDARD PIPE, Threaded and Coupled

Carload discounts from list, %

Size—Inches	2		2½		3		3½		4		5		6	
List Per Ft	37c		55.5c		76.5c		92c		$1.09		$1.48		$1.92	
Pounds Per Ft	3.66		5.82		7.62		9.20		10.89		14.81		19.18	
	Blk	Galv*	Blk	Galv*	Blk	Galv*	Blk	Galv*	Blk	Galv*	Blk	Galv*	Blk	Galv*
Aliquippa, Pa. J5	4	+14	10.5	+8.25	13	+5.75	14.5	+4.25	14.5	+4.25	14	+4.75	16.5	+2.25
Ambridge, Pa. N2	4	..	10.5	....	13	....	14.5	....	14.5	....	14	....	16.5	....
Lorain, O. N3	4	+14	10.5	+8.25	13	+5.75	14.5	+4.25	14.5	+4.25	14	+4.75	16.5	+2.25
Youngstown Y1	6.5	+11.5	10.5	+8.25	13	+5.75	14.5	+4.25	14.5	+4.25	14	+4.75	16.5	+2.25

ELECTRIC WELD STANDARD PIPE, Threaded and Coupled

Carload discounts from list, %

Youngstown R2	6.5	+11.5	10.5	+8.25	13	+5.75	14.5	+4.25	14.5	+4.25	14	+4.75	16.5	+2.25

BUTTWELD STANDARD PIPE, Threaded and Coupled

Carload discounts from list, %

Size—Inches	⅛		¼		⅜		½		¾		1		1¼	
List Per Ft	5.5c		6c		8c		8.5c		11.5c		17c		23c	
Pounds Per Ft	0.24		0.42		0.57		0.85		1.13		1.68		2.28	
	Blk	Galv*	Blk	Galv*	Blk	Galv*	Blk	Galv*	Blk	Galv*	Blk	Galv*	Blk	Galv*
Aliquippa, Pa. J5	....	....	....	....	....	....	18.5	+0.75	21.5	3.25	24	6.75	26.5	8.5
Alton, Ill. L1	....	....	....	....	....	....	16.5	+2.75	19.5	1.25	22	4.75	24.5	6.5
Benwood, W. Va. W10	17.5	+13	9	+18.5	+0.75	+28.5	18.5	+0.75	21.5	3.25	24	6.75	26.5	8.5
Butler, Pa. F6	18	+12.5	9.5	+18	1.5	+26	....	....	....	....	....	....	....	....
Etna, Pa. N2	....	....	....	....	....	....	18.5	+0.75	21.5	3.25	24	6.75	26.5	8.5
Fairless, Pa. N3	....	....	....	....	....	....	16.5	+2.75	19.5	1.25	22	4.75	24.5	6.5
Fontana, Calif. K1	....	....	....	....	....	....	4	+13.25	9	+9.25	11.5	+5.75	14	+4
Ind. Harbor, Ind. Y1	....	....	....	....	....	....	17.5	+1.75	20.5	2.25	23	5.75	25.5	7.5
Lorain, O. N3	....	....	....	....	....	....	18.5	+0.75	21.5	3.25	24	6.75	26.5	8.5
Sharon, Pa. S4	18	+12.5	9.5	+18	1.5	+26	....	....	....	....	....	....	....	....
Sharon, Pa. M6	....	....	....	....	....	....	18.5	+0.75	21.5	3.25	24	6.75	26.5	8.5
Sparrows Pt., Md. B2	18	+12.5	7.5	+18	+0.5	+25	16.5	+0.75	19.5	3.25	22	6.75	24.5	8
Youngstown R2, Y1	....	....	....	....	....	....	18.5	+0.75	21.5	3.25	24	6.75	26.5	8.5
Wheatland, Pa. W9	18	+12.5	9.5	+18	1.5	+26	18.5	+0.75	21.5	3.25	24	6.75	26.5	8.5

Size—Inches	1¼		2		2½		3		3½		4	
List Per Ft	37.5c		37c		55.5c		76.5c		92c		$1.09	
Pounds Per Ft	2.73		3.68		5.82		7.62		9.20		10.89	
	Blk	Galv*	Blk	Galv*	Blk	Galv*	Blk	Galv*	Blk	Galv*	Blk	Galv*
Aliquippa, Pa. J5	27	9.5	27.5	10	29	10.75	29	10.75	....	....	....	....
Alton, Ill. L1	25	7.5	25.5	8	27	8.75	27	8.75	....	....	....	....
Benwood, W. Va. W10	27	9.5	27.5	10	29	10.75	29	10.75	19.5	0.75	19.5	0.75
Etna, Pa. N2	27	9.5	27.5	10	29	10.75	29	10.75	19.5	0.75	19.5	0.75
Fairless, Pa. N3	25	7.5	25.5	8	27	8.75	27	8.75	17.5	+1.25	17.5	+1.25
Fontana, Calif. K1	14.5	+3	15	+2.5	16.5	+1.75	16.5	+1.75	7	+11.75	7	+11.75
Ind. Harbor, Ind. Y1	26	8.5	26.5	9	28	9.75	28	9.75	18.5	+0.25	18.5	+0.25
Lorain, O. N3	27	9.5	27.5	10	29	10.75	29	10.75	....	....	....	....
Sharon, Pa. M6	27	9.5	27.5	10	29	10.75	29	10.75	....	....	....	....
Sparrows Pt., Md. B2	25	9	25.5	9.5	27	9.75	27	9.75	17.5	+0.25	17.5	+0.25
Wheatland, Pa. W9	27	9.5	27.5	10	29	10.75	29	10.75	19.5	0.75	19.5	0.75
Youngstown R2, Y1	27	9.5	27.5	10	29	10.75	29	10.75	19.5	0.75	19.5	0.75

*Galvanized pipe discounts based on current price of zinc (13.50c, East St. Louis).

Stainless Steel

Representative prices, cents per pound; subject to current lists of extras

AISI Type	Rerolling: Ingot	Rerolling: Slabs	Forging Billets	Seamless Tube Billets	H.R. Strip	Wire Rods; C.F. Wire	Bars; Structural Shapes	Plates	Sheets	C.R. Strip; Flat Wire
201	18.80	23.00	....	....	31.00	....	....	42.25	29.00	29.00
202	19.75	25.50	31.00	30.25	33.50	....	36.75	36.75	42.50	42.50
301	19.25	23.75	....	30.75	32.00	36.00	38.00	....	44.25	41.00
302	20.50	26.25	32.00	37.25	34.50	38.25	38.25	40.25	44.50	44.50
302B	20.25	26.50	33.00	37.25	37.75	38.25	38.25	40.25	47.00	47.00
303	....	28.75	34.75	40.00	....	39.00	41.00	....	....	....
304	21.75	27.50	33.75	39.00	37.25	38.25	40.25	43.00	47.25	47.25
304L	....	....	40.25	....	43.75	45.25	47.25	50.00	54.25	54.25
305	23.25	30.50	....	39.50	40.25	38.25	40.25	43.50	50.25	50.25
308	25.00	32.00	40.00	....	42.75	45.25	47.50	51.75	54.00	54.00
309	32.50	41.25	48.25	....	55.00	54.00	56.75	60.25	69.00	69.00
310	39.75	50.50	64.75	....	71.00	72.25	76.50	78.25	81.75	81.75
314	....	....	....	....	....	72.75	....	78.25	....	....
316	33.00	41.75	52.75	....	59.75	59.75	62.75	66.00	70.25	70.25
316L	....	....	58.75	....	65.75	66.75	69.75	73.00	77.25	77.25
317	40.25	51.25	65.75	....	78.50	74.75	78.50	81.00	87.75	87.75
321	26.50	33.50	39.75	....	45.75	45.00	47.25	51.25	56.25	56.25
18-8CbTa	30.75	39.50	47.25	....	54.75	52.75	55.50	60.00	65.50	65.50
403	....	....	28.75	32.75	....	32.25	34.00	36.25	....	....
405	17.50	23.00	26.75	31.00	32.25	30.50	32.00	33.75	42.25	42.25
410	15.00	19.50	25.50	29.50	28.00	29.00	30.50	31.75	36.25	36.25
416	....	....	26.00	30.00	....	29.50	31.00	....	....	....
420	....	30.25	31.00	36.00	37.75	35.50	37.25	40.75	56.00	56.00
430	15.25	19.75	26.00	30.00	28.75	29.50	31.00	32.25	36.75	36.75
430F	....	....	26.50	30.50	....	30.00	31.50	....	....	....
431	....	25.50	33.25	....	37.25	39.25	40.75	....	....	....
446	....	....	35.50	40.50	53.25	40.00	42.00	43.25	63.25	63.25

Stainless Steel Producers Are: Allegheny Ludlum Steel Corp.; Alloy Metal Wire Co. Inc.; Alloy Tube Div., Carpenter Steel Co.; American Steel & Wire Div., U. S. Steel Corp.; Armco Steel Corp.; Babcock & Wilcox Co.; Bethlehem Steel Co.; J. Bishop & Co.; G. O. Carlson Inc.; Carpenter Steel Co.; Charter Wire Products Co.; Cold Metal Products Co.; Crucible Steel Co. of America; Damascus Tube Co.; Wilbur B. Driver Co.; Driver-Harris Co.; Eastern Stainless Steel Corp.; Elwood Ivins Steel Tube Works Inc.; Firth Sterling Inc.; Ft. Wayne Metals Inc.; Globe Steel Tubes Co.; Helical Tube Co.; Indiana Steel & Wire Co.; Ingersoll Steel Div., Borg-Warner Corp.; Jessop Steel Co.; Johnson Steel & Wire Co. Inc.; Joslyn Mfg. & Supply Co.; Kenmore Metals Corp.; Maryland Fine & Specialty Wire Co.; McLouth Steel Corp.; Metal Forming Corp.; McInnes Steel Co.; National-Standard Co.; National Tube Div., U. S. Steel Corp.; Newman-Crosby Steel Co.; Pacific Tube Co.; Page Steel & Tube Div., American Chain & Cable Co. Inc.; Pittsburgh Rolling Mills Inc.; Republic Steel Corp.; Rodney Metals Inc.; Rome Mfg. Co.; Rotary Electric Steel Co.; Sharon Steel Corp.; Sawhill Tubular Products Inc.; Simonds Saw & Steel Co.; Specialty Wire Co. Inc.; Spencer Wire Corp.; Stainless Welded Products Inc.; Standard Tube Co.; Superior Steel Corp.; Superior Tube Co.; Timken Roller Bearing Co.; Trent Tube Co.; Tube Methods Inc.; Ulbrich Stainless Steels; United States Steel Corp.; Universal-Cyclops Steel Co.; Wallingford Steel Co.; Washington Steel Corp.

Clad Steel

	Plates: Carbon Base 10%	Plates: Carbon Base 20%	Sheets: Carbon Base 20%
302	....	....	30.50
304	31.55	37.95	32.50
304-L	34.10	40.90	....
316	36.50	42.75	47.00
316-L	42.30	50.10	....
316-CB	42.50	50.50	....
321	33.25	39.65	37.25
347	36.20	44.35	48.25
405	26.35	33.85	....
410	28.85	33.35	....
430	28.85	33.35	....
Inconel	50.00	65.95	....
Nickel	41.00	56.15	....
Nickel, Low Carbon	43.80	60.55	....
Monel	44.50	60.50	....
Copper*	....	....	46.00

	Strip, Carbon Base—Cold Rolled: 10%	Strip, Carbon Base—Cold Rolled: Both Sides
Copper*	33.40	42.15

*Deoxidized. Production points: Stainless-clad sheets, New Castle, Ind. I-4; stainless-clad plates, Claymont, Del. C22, Coatesville, Pa. L7, New Castle, Ind. I-4 and Washington, Pa. J3; nickel, inconel, monel-clad plates, Coatesville L7; copper-clad strip, Carnegie, Pa. S18.

Tool Steel

Grade	$ per lb	Grade	$ per lb
Regular Carbon	0.275	5% Cr Hot Work	0.430-0.460
Extra Carbon	0.320	W-Cr Hot Work	0.450
Special Carbon	0.390	V-Cr Hot Work	0.470
Oil Hardening	0.430	Hi-Carbon-Cr	0.770

Grade by Analysis (%)

W	Cr	V	Co	Mo	$ per lb
20.25	4.25	1.6	12.25	....	4.090
18.25	4.25	1	4.75	....	2.305-2.475
18	4	2	9	....	2.675-2.6775
18	4	2	....	....	1.765
18	4	1	....	....	1.600
13.75	3.75	2	5	....	2.245
13.5	4	3	....	....	1.865
9	3.5	..	....	....	1.180
6	4	2	....	5	1.105
6	4	3	....	6	1.350
1.5	4	1	....	8.5	0.960

Tool steel producers include: A4, A8, B2, B8, C4, C9, C13, C18, D4, F2, J3, M14, S8, U4, V2 and V3.

Pig Iron

F.o.b. furnace prices in dollars per gross ton, as reported to STEEL. Minimum delivered prices are approximate and do not include 3% federal tax.

Birmingham District	Basic	No. 2 Foundry	Malleable	Bessemer
AlabamaCity,Ala. R3	54.50	....	....	....
Birmingham R2	54.50	55.00‡	....	....
Birmingham U6	....	*59.00†*	*63.00*	....
Woodward,Ala. W15	54.50	55.00‡	59.00	....
Cincinnati, deld.	....	62.70	....	....
Buffalo District				
Buffalo H1, R2	60.00	60.50	61.00	61.50
Tonawanda,N.Y. W12	60.00	60.50	61.00	61.50
N.Tonawanda,N.Y. T9	....	60.50	61.00	61.50
Boston, deld.	70.65	71.15	71.65	....
Rochester,N.Y., deld.	63.02	63.52	64.02	....
Syracuse,N.Y., deld.	64.12	64.62	65.12	....
Chicago District				
Chicago I-3	60.00	60.50	60.50	61.00
Gary,Ind. U5	60.00	....	60.50	....
S.Chicago R2	60.00	....	60.50	....
S.Chicago,Ill. Y1	60.00	60.50	60.50	61.00
S.Chicago,Ill. U5, W14	60.00	....	60.50	61.00
Milwaukee, deld.	62.30	62.80	62.80	63.30
Muskegon,Mich., deld.	....	67.18	67.18	....
Cleveland District				
Cleveland R2, A7	60.00	60.50	60.50	61.00
Akron,O., deld.	62.75	63.25	63.25	63.75
Mid-Atlantic District				
Bethlehem,Pa. B2	62.00	62.50	63.00	63.50
NewYork, deld.	....	64.51	67.01	....
Newark, deld.	65.29	65.79	66.29	66.79
Birdsboro,Pa. B10	62.00	62.50	63.00	63.50
Chester,Pa. P14	62.60	62.50	63.00	....
Philadelphia, deld.	63.76	64.26	64.76	....
Steelton,Pa. B2	62.00	62.50	63.00	63.50
Swedeland,Pa. A3	62.00	62.50	63.00	63.50
Philadelphia, deld.	63.76	64.26	64.76	65.26
Troy,N.Y. R2	62.00	62.50	63.00	63.50
Pittsburgh District				
NevilleIsland,Pa. P6	60.00	60.50	60.50	61.00
Pittsburgh (N&S sides), Aliquippa, deld.	....	61.95	61.95	62.45
McKeesRocks, deld.	....	61.60	61.60	62.13
Lawrenceville, Homestead, Wilmerding,Monaca, deld.	....	62.26	62.26	62.79
Verona,Trafford, deld.	62.29	62.82	62.82	63.35
Brackenridge, deld.	62.60	63.10	63.10	63.63
Bessemer,Pa. U5	60.00	....	60.50	61.00
Clairton,Rankin,S.Duquesne,Pa. U5	60.00	....	....	....
Midland,Pa. C18	60.00	....	....	....

Youngstown District	Basic	No. 2 Foundry	Malleable	Bessemer
Hubbard,O. Y1	....	....	60.50	....
Sharpsville,Pa. S6	60.00	....	60.50	61.00
Youngstown Y1	....	....	60.50	61.00
Mansfield,O., deld.	64.50	....	65.40	65.90
Duluth I-3	60.00	60.50	60.50	61.00
Erie,Pa. I-3	60.00	60.50	60.50	61.00
Everett,Mass. M1	62.00	62.50	63.00	....
Fontana,Calif. K1	67.50	68.00	....	....
Geneva,Utah C11	60.00	60.50	....	....
GraniteCity,Ill. G4	61.90	62.40	62.90	....
Ironton,Utah C11	60.00	60.50	....	....
LoneStar,Texas L6	....	55.00*	....	....
Minnequa,Colo. C10	62.00	62.50	63.00	....
Rockwood,Tenn. T3	....	55.00‡	59.00	....
Toledo,O. I-3	60.00	60.50	60.50	61.00
Cincinnati, deld.	60.76	60.26	....	....

*Phos. 0.51-0.75%; $56, Phos. 0.31-0.50%.
†Phos. 0.70-0.90; intermediate (Phos. 0.31-0.70%), $60.
‡Phos. 0.70-0.90; intermediate (Phos. 0.31-0.69%), $56

PIG IRON DIFFERENTIALS

Silicon: Add 50 cents per ton for each 0.25% Si or percentage thereof over base grade, 1.75-2.25%, except on low phos iron on which base is 1.75-2.00%.

Manganese: Add 50 cents per ton for each 0.50% manganese over 1% or portion thereof.

Nickel: Under 0.05% no extra; 0.50-0.74%, inclusive, add $2 per ton and each additional 0.25%, add $1 per ton.

BLAST FURNACE SILVERY PIG IRON, Gross Ton

(Base 6.00-6.50% silicon; add $1.20 for each 0.5% Si; 75 cents for each 0.50% Mn over 1%)

Jackson,O. G2, J1	69.00
Buffalo H1	70.25

ELECTRIC FURNACE SILVERY IRON, Gross Ton

(Base 14.01-14.50% silicon; add $1 for each 0.5% Si to 18%; $1 for each 0.50% Mn over 1%; $2 per gross ton premium for 0.045% max P)

NiagaraFalls,N.Y. P15	$92.50
Keokuk,Iowa, Open-hearth & Fdry, (freight allowed K2)	97.00
Keokuk, O. H. & Fdry, 12½ lb pigiets, 16% Si, frgt allowed K2	100.00

LOW PHOSPHORUS PIG IRON, Gross Ton

Lyles,Tenn. T3 (Phos. 0.055% max)	$72.50
Rockwood,Tenn. T3 (Phos. 0.035% max)	72.50
Steelton,Pa. B2 (Phos. 0.035% max)	68.00
Philadelphia, deld.	71.55
Troy,N.Y. R2 (Phos. 0.035% max)	68.00
Cleveland A7 (Intermediate) (Phos. 0.036-0.075% max)	65.00
Duluth I-3 (Intermediate) (Phos. 0.036-0.075% max)	65.00
Erie,Pa. I-3 (Intermediate) (Phos. 0.036-0.075% max)	65.00
NevilleIsland,Pa. P6 (Intermediate) (Phos. 0.036-0.075% max)	65.00

Warehouse Steel Products

Representative prices, per pound, subject to extras, f.o.b. warehouse. City delivery charges are 15 cents per 100 lb except: St. Paul, 25 cents; Moline, Norfolk, Richmond, Washington, 20 cents; Baltimore, Boston, Los Angeles, New York, Philadelphia, Portland, San Francisco, Spokane, 10 cents; Atlanta, Houston, Seattle, no charge.

	SHEETS				STRIP	BARS				Standard Structural Shapes	PLATES	
	Hot-Rolled	Cold-Rolled	Gal. 10 Ga.†	Stainless Type 302	Hot-Rolled*	H.R. Merchant Qual.	H.R. Spec. Qual.	C.F. Rds.‡	H.R. Alloy 4140†°		Carbon	Floor
Atlanta	7.14	8.20	8.87	....	7.40	7.43	...	9.39	....	7.63	7.49	9.45
Baltimore	7.24	8.35	8.80	....	7.70	7.70	...	8.49°	14.39	7.84	7.56	9.02
Birmingham	7.13	8.24	8.85	....	7.21	7.27	7.80	9.35	....	7.43	7.45	9.50
Boston	8.12	9.07	10.32	53.32	8.21	8.21	8.76	9.86	13.66	8.27	8.41	9.84
Buffalo	7.20	8.25	10.01	....	7.35	7.35	8.05	7.90	13.50	7.60	7.65	9.00
Chattanooga	7.38	8.44	8.60	....	7.36	7.42	7.95	9.18	....	7.63	7.60	9.32
Chicago	7.13	8.24	9.10	46.75	7.21	7.27	7.80	7.75	13.15	7.43	7.45	8.72
Cincinnati	7.25	8.23	9.10	46.10	7.45	7.51	8.04	8.15	13.40	7.90	7.74	8.97
Cleveland	7.13	8.24	8.95	49.16	7.31	7.33	7.86	8.00	13.21	7.76	7.62	8.89
Denver	8.95	10.31	11.73	....	9.10	9.10	...	9.82	17.37	8.95	9.10	10.50
Detroit	7.32	8.43	9.38	43.80	7.49	7.58	8.08	8.04	13.39	7.90	7.73	8.91
Erie, Pa.	7.08	8.24	8.95†°	....	7.31	7.35	...	8.10†°	....	7.65	7.30	8.79
Houston	7.85	8.75	10.49	....	8.15	8.25	...	9.85	14.90	8.20	7.80	9.20
Jackson, Miss.	7.46	8.53	9.32	....	7.44	7.99	8.12	9.44	....	7.75	7.77	9.41
Los Angeles	8.15	10.00	11.00	51.50	8.50	8.15	8.70	10.90	14.40	8.30	8.75	10.85
Milwaukee	7.22	8.33	9.19	....	7.30	7.36	7.99	7.94	13.24	7.60	7.54	8.81
Moline, Ill.	7.15	8.44	8.85	....	7.41	7.43	...	8.60	....	7.63	7.24	...
New York	7.78	8.88	9.63	53.13	8.23	8.16	8.71	9.77	13.57	8.11	8.21	9.50
Norfolk, Va.	7.35	...	...	....	7.80	7.85	...	9.95	....	8.10	7.60	9.10
Philadelphia	7.34	8.44	9.41	....	7.99	7.73	8.26	8.52	13.25	7.75	7.72	8.53°°
Pittsburgh	7.13	8.24	9.40	49.00	7.31	7.27	7.80	8.00	13.15	7.43	7.45	8.72
Portland, Oreg.	8.30	8.80	10.80	....	8.35	8.25	...	12.55	15.30	8.60	8.30	9.45
Richmond, Va.	7.25	...	9.49	....	7.85	7.85	...	9.50	....	8.10	7.50	9.35
St. Louis	7.42	8.53	9.39	43.89	7.50	7.56	8.09	8.29	13.44	7.63	7.74	9.01
St. Paul	7.46	8.59	9.16	....	7.72	7.74	...	8.51	13.51	7.94	7.65	9.12
San Francisco	8.20	9.65	10.15	51.45	8.35	8.15	8.70	11.45	14.40‡	8.25	8.30	10.50
Seattle	8.75	10.50	10.90	49.60	8.90	8.60	9.15	12.25	14.75	8.50	8.50	10.70
Spokane, Wash.	8.75	11.10	10.90	....	8.90	8.60	9.15	12.25	15.40	8.50	8.50	11.20
Washington	7.78	9.80	8.60	....	8.49	8.24	...	9.40	....	8.51	8.11	9.56

*Prices do not include gage extras; †prices include gage and coating extras (based on 12.50c zinc at Los Angeles and 13.50c at other points), except in Birmingham (coating extra excluded); ‡includes 35-cent bar quality extras; **½-in. and heavier; ††as annealed; §§under ½-in.

Base quantities, 2000 to 4999 lb except as noted; Cold-rolled strip and cold-finished bars, 2000 lb and over except in Seattle, 2000 to 9999 lb, and in Los Angeles, 6000 lb and over; stainless sheets, 5000 lb except in Chicago, New York and Boston, 10,000 lb and in San Francisco, 2000 to 4999 lb; hot-rolled products on West Coast, 2000 to 9999 lb; ³—500 to 9999 lb; ⁴—400 to 999 lb; ⁵—4000 lb and over; ⁶—1000 to 1999 lb; ⁷—1500 to 3999 lb; ⁸—2000 to 3999 lb; ⁹—f.o.b. local delivery in lots of 10,000 lb and over; ¹⁰—2000 lb and over.

Photos, courtesy The American Magnetics Company, Moline, Ill.

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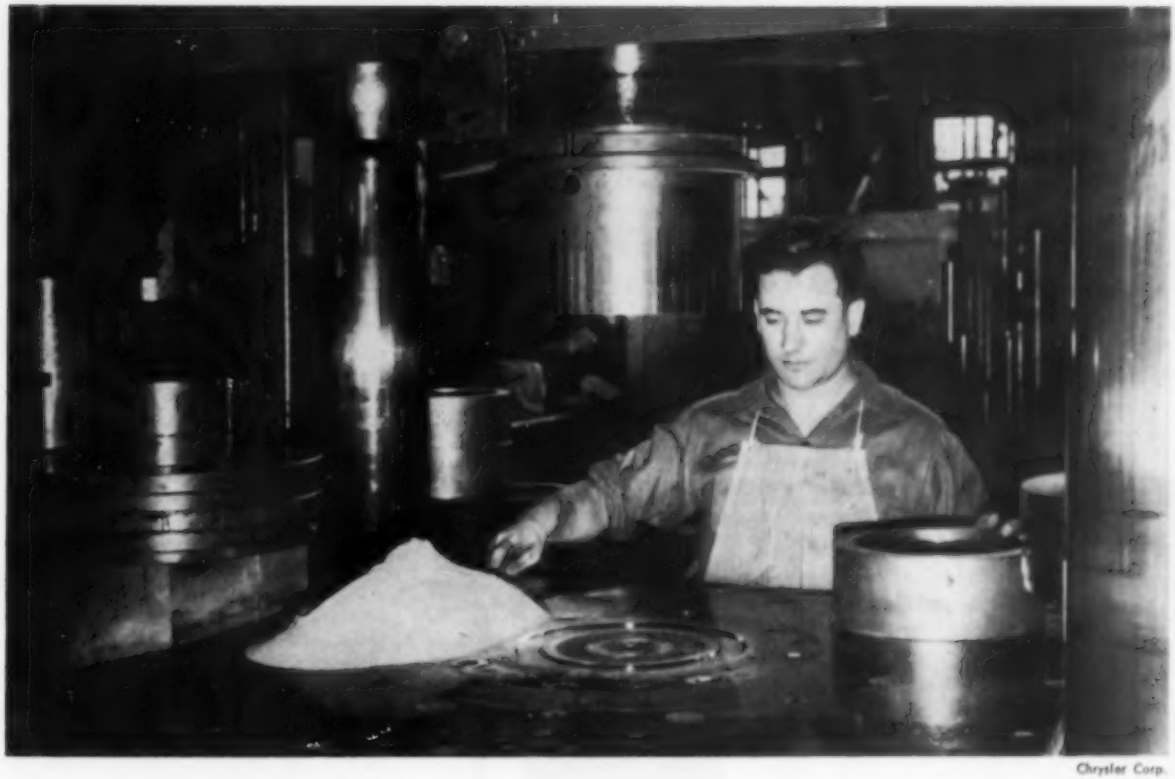

Chrysler Corp.

Bigger Powder Metal Parts

Present growth of markets is steady though not spectacular. But research is developing new products and new markets which will increase output from pounds to tons

BIG THINGS are shaping up for the metal powder industry, both product and marketwise. New techniques and presses make it possible to fabricate parts weighing 8 to 10 lb.

To an industry that's used to thinking in terms of ounces, this is good news. It opens up a new market which soon may be measured in tons.

Back to Earth—For the present, the pattern of market development is described as "steady and unspectacular" by some producers. Shipments of iron powder for the first five months of this year averaged about 3.6 million lb, compared with a little over 3.4 million lb during the corresponding period last year, says the Metal Powder Association. The important point here is that the largest single consumer group—automotive—has not been buying as much as it did last year. Other users have picked up interest in this material to fill the gap. If automotive perks up in the third and fourth quarters, this year will show a fair improvement over last year.

Because iron powder is the kingpin in this industry, you don't hear too much about the others—grain copper, copper-base alloys, tin, lead, solder and many other nonferrous metals. But their use is growing, too. One producer of brass powder says: "We're in this business because we think it has a real future in pressed and sintered parts."

Possibility—Solder stands as good a chance as any to up its powder metal poundage. Auto makers are using it as a filler under the paint on auto bodies. It is applied to the base metal with a brush, then put through a furnace. It is easier to apply than solder in wire or bar form and gives a smoother finish.

Copper powder, next to iron the most important on a tonnage basis, looks like a good bet. The big problem producers face is the price. There has been some switch to substitutes because of this, but at least one producer says it has not been significant. Now that the outside market price has broken (see page 128), he feels the road is open for further growth.

Still Looking—Most producers and fabricators of metal powders are active in research and development, which they hope will trigger more spectacular gains in metal powder usage. United States Metals Refining Co., a subsidiary of American Metal Co. Ltd., recently completed a $350,000 research lab in Carteret, N. J. Such active programs are uncovering many new methods and products.

Supply is the least of the industry's worries. Capacity for iron powder is estimated at 55,000 tons a year, but production is at only about half that rate. Yet producers are so confident of the future they are expanding to meet expected demand. Easton Metal Powder Co., New York,

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for example, is doubling its capacity on Aug. 15.

Domestic Vs. Foreign—This is part of a trend which eventually will make the U.S. self-sufficient in powder metals. Until 1955, over half our iron powder came from Sweden. In that year, Hoeganaes Sponge Iron Corp., supplier of this foreign material, built a plant in Riverton, N. J. It is now building another to produce its MH 100 powder in this country. While some fabricators will always use certain grades of Swedish powders, they claim that for the most part the domestically produced material is as good as, in some respects better than, the foreign product.

To make the domestically produced MH 100 competitive with other powders when the production switch comes off later this year, Hoeganaes reduced the price 1 cent a pound last month. Although this is a special case, industry spokesmen feel that the general price level of metal powders will come down with greater usage. They are banking partly on the development of larger parts to turn the trick. One company already has installed a 500-ton press and ordered two larger presses capable of making 4 and 5 lb pieces with greater structural strength and less porosity. This may be the first step to greater markets for the metal powder industry.

Steel Bars . . .

Bar Prices, Page 132

Copperweld Steel Co., Warren, O., which is operating under a 15-day extension of its contract with the steelworkers' union, advanced prices on carbon and alloy billets and bars $10 per ton, effective midnight July 1. The increase was arbitrarily effected to protect the company against retroactive wage increases upon settlement of the labor dispute in the industry.

Inventories of most consumers of carbon bars are in fairly good shape. Some say they can carry on operations for a month without too much difficulty. Exceptions include those that require large sizes, which have been in scarce supply for many weeks.

Supplies of cold-finished bars eased considerably in June, and most buyers are well stocked entering the third quarter. Most customers think they can operate for a month despite the steel strike.

Many of the cold-finished bar mills were not disturbed by the steel strike and continue to operate. For the most part, they have supplies of hot

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bars adequate to support their operations three to four weeks.

Vacation schedules at many small manufacturing plants using cold-drawn bars will decrease shipments this month.

Hot-rolled barmakers have cut their backlogs of unfilled orders except for certain of the larger sizes which are in tight supply.

Reinforcing Bars . . .

Reinforcing Bar Prices, Page 132

Strong demand for reinforcing bars continues. Suspension of shipments from some of the mills because of the strike will drive more business to warehouse suppliers. Distributors indicate they will first seek to protect their regular customers as far as possible before entertaining business from new sources.

In the St. Louis market, it was reported last week that producers were under pressure for bars and mesh. One mill has had to pass up a considerable number of orders, it was said. At Los Angeles, demand was described as spotty, with bar fabricators placing orders for September shipment. Considerable business is reported pending in the Pacific Northwest, but the steel strike is tending to hold up orders.

Tubular Goods . . .

Tubular Goods Prices, Page 136

The oil and gas industry does not have enough steel tubing in stock to care for its summer requirements. Some well drilling may be suspended this month, especially if shipments of high alloy tubing are halted, even for a brief period.

The Federal Power Commission granted the Tennessee Gas Transmission Co., Houston, temporary authority to construct 162 miles of main line pipe and 13,940 compressor horsepower at an estimated cost of $20,337,940. Tennessee Gas proposes to construct 99 miles of 26-in. main line loop in Ohio and Pennsylvania; 62 miles of 30-in. main line loop in Kentucky; and the addition of 13,940 compressor horsepower at stations in Massachusetts, Louisiana, Mississippi and Tennessee.

Buttweld pipe mill bookings were heavier last month than they have been in recent months in the St. Louis area.

Sheets, Strip . . .

Sheet & Strip Prices, Pages 133 & 134

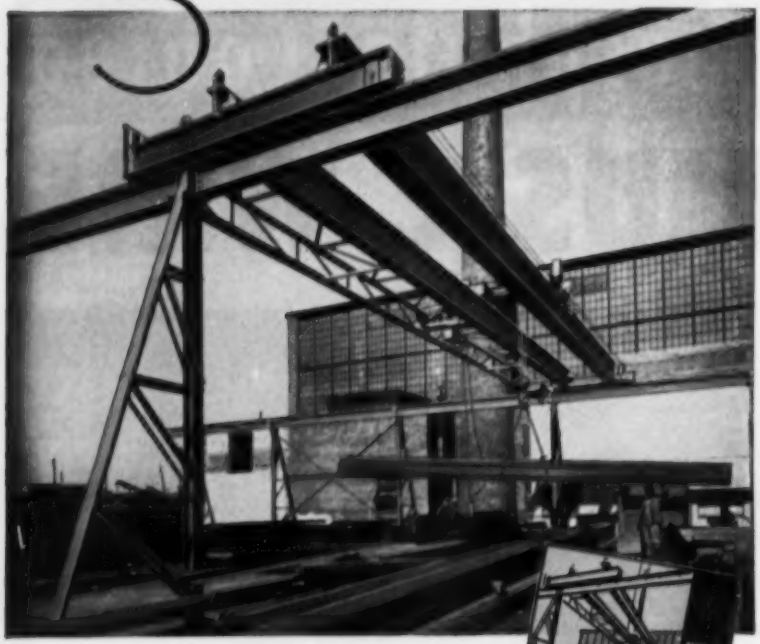
Most consumers of sheet and strip accumulated some inventories in recent weeks. At the opening of the third quarter, supply conditions are the best they have been in quite some time. Still, the cutting off of mill shipments will serve to keep the market under pressure, especially should the strike be prolonged indefinitely.

Stocks are estimated to average from 45 to 60 days, taking into consideration the fact that manufacturing operations will be curtailed throughout July because of vacations. This month, it is thought, will be the dullest of the year so far as consumption of the flat-rolled products is concerned.

There was a flurry of activity at warehouses and mills as they shipped out the last of the sheet tonnage on hand before the June 30 labor contract deadline. Distributors expected that shipments would decline in early third quarter, with fabricating plants closing down for vacations and needing only limited spot tonnage throughout July.

The auto builders displayed no noticeable concern over the steel strike. They are well stocked with light flat-rolled products, notably cold-rolled sheets. So far, they have not indicated the extent of their needs

3 reasons why...



CRANEMASTER
is your top value!

- *You save on engineering cost* because there's a *standardized* CRANEMASTER for virtually every building condition.
- *You save on production cost* because time and material savings of modern manufacturing techniques are passed along to you.
- *You gain long term efficiency*, because CRANEMASTER is soundly designed and carefully built for maximum performance, minimum maintenance.

CAPACITIES to 15 TONS—SPANS to 60 FT.

send for
BULLETIN C-110

Describes in detail the many design and operating advantages of CRANEMASTER overhead traveling Cranes. Also explains how Abell-Howe provides competent service from original survey to final installation.

ABELL-HOWE COMPANY 7747 Van Buren Street • Forest Park, Illinois

for late third quarter when production on the new model autos is scheduled to get under way. Auto builders are not expected to be actively in the sheet market until some time in August.

Some sheet tonnage is still coming out of the Conshohocken, Pa., mills where labor contracts do not expire until the end of this month. Otherwise, sheet production in the East is negligible. Most area fabricators have sufficient stocks of sheets to support their operations for the next few weeks, especially if allowance is made for curtailed manufacturing schedules due to vacations.

Wire . . .

Wire Prices, Pages 134 & 135

Seasonal demand for merchant wire products this spring did not meet the expectations of mills. Manufacturers grades have held up in strong demand, except on automotive account, and some wire items are reported in relatively tight supply.

In the Midwest, notably at St. Louis, demand for wire generally is reported off, including bed spring wire. Yet bookings for the third quarter are reported satisfactory. Auto cushion wire is not picking up, and sellers do not anticipate any marked pickup until late third quarter.

Plates . . .

Plate Prices, Page 132

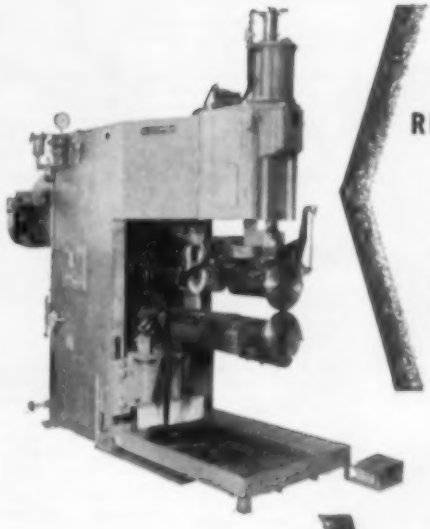
Even though the steel strike should prove to be short lived, the interruption of mill operations will intensify the shortage of plates, which are probably in tightest supply of all the major carbon products.

Some industrial construction, freight car building, tank fabrication and other work are expected to be slowed down sharply within a couple weeks. Fabricating shops, in general, have only enough steel in stock to support operations a few weeks. A builder of mine and mill building at Pittsburgh will cut operations before the end of this month.

Although more gray market plate is being offered, it is restricted to the lighter gages. There are rumors circulating that some mills may be able to divert more semifinished tonnage to the plate mills in event they are not tied up too long by the strike.

Imports of plate tonnage from Canada by some Pennsylvania state construction companies is reported. These firms continue to lack heavy sizes, which slows down their entire construction program.

Plate consumers on the Pacific



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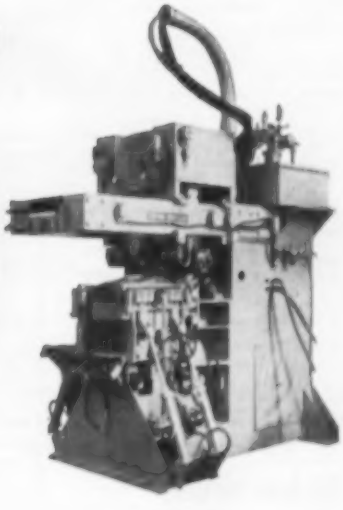
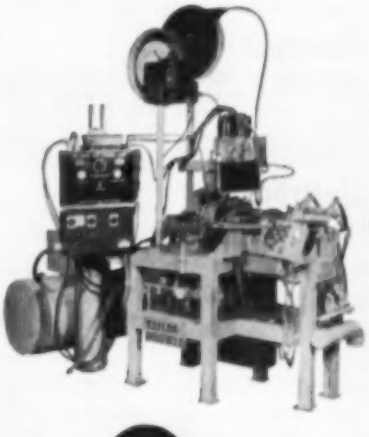
Efficient, versatile for all basic uses; low operating cost, prompt delivery, long service life. T-W manufactures a complete line of resistance welder equipment—spot, seam, projection and flash-butt.

SPECIAL RESISTANCE WELDERS

Resistance welders specifically designed for your work—most efficient production, including mechanical features, such as feed, handling, discharge, bending, forming or machining.





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Custom designed for arc-welding assemblies on a production basis. All modern welding methods and equipment are incorporated. T-W are specialists in production line techniques.

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WARREN, OHIO

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OAKVILLE AND WINDSOR, ONTARIO

Ores

Lake Superior Iron Ore

(Prices effective for the 1956 shipping season, gross ton, 51.50% iron natural, rail of vessel, lower lake ports.)

Old range bessemer $11.25
Old range nonbessemer 11.10
Mesabi bessemer 11.00
Mesabi nonbessemer 10.85
Open-hearth lump 12.10
High phos. 10.85

The foregoing prices are based on upper lake rail freight rates, lake vessel freight rates, handling and unloading charges, and taxes thereon, which were in effect Dec. 1, 1955, and increases or decreases after such date are for seller's account.

Eastern Local Iron Ore

Cents per unit, deld. E. Pa.

Foundry and basic 52-62% concentrates contract 17.00-18.00

Foreign Iron Ore

Cents per unit, c.i.f Atlantic ports

Swedish basic, 65% 25.00
N. African hematite (spot)....nom. 24.00-25.00
Brazilian iron ore, 68-69% 33.00

Tungsten Ore

Net ton unit, before duty

Foreign, wolframite, good commercial quality ..... $33.00-$35.50
Domestic, scheelite, mine 63.00

Manganese Ore

Mn 48%, delivery within six months, $1.30-$1.35 nom., per long ton unit, c.i.f. U. S. ports, duty for buyer's account; 46-47%, $1.05-$1.10 nom.

Chrome Ore

Gross ton, f.o.b. cars New York, Philadelphia, Baltimore, Charleston, S. C., plus ocean freight differential for delivery to Portland, Oreg., Tacoma, Wash.

Indian and African

48% 2.8:1 .....nom. $45.00-$50.00
48% 3:1 .....42.00-44.00
48% no ratio 34.00

South African Transvaal

44% no ratio ..... $26.00-$28.00
48% no ratio 33.00-35.00

Domestic

Rail nearest seller

18% 3:1 ..... $39.00

Molybdenum

Sulphide concentrate, per lb of Mo content, mines, unpacked $1.10

Antimony Ore

Per unit of Sb content, c.i.f. seaboard

55-60% .....$3.40-$3.85
60-65% 3.85-3.95

Vanadium Ore

Cents per lb V_2O_5 content, deld. mills

Domestic 31.00

Refractories

Fire Clay Brick (per 1000)

High-Heat Duty: Ashland, Grahn, Hayward, Hitchins, Haldeman, Olive Hill, Ky., Athens, Troup, Tex., Beech Creek, Clearfield, Curwensville, Lock Haven, Lumber, Orviston, West Decatur, Pa., Bessemer, Ala., Farber, Mexico, St. Louis, Vandalia, Mo., Ironton, Oak Hill, Parral, Portsmouth, O., Ottawa, Ill., Stevens Pottery, Ga., $122; Salina, Pa., $127; Niles O., $133.

Super-Duty: Ironton, O., Vandalia, Mo., Olive Hill, Ky., Clearfield, Pa., New Savage, Md., St. Louis, $159.

Silica Brick (per 1000)

Standard: Alexandria, Claysburg, Mt. Union, Sproul, Pa., Ensley, Ala., Windham, Portsmouth, O., Hawstone, Pa., $128; Warren, Niles, O., Hays, Pa., $133; Morrisville, Pa., $131.50; E. Chicago, Ind., Joliet, Rockdale, Ill., $138; Lehigh, Utah, $144; Los Angeles, $151.

Super Duty: Hays, Sproul, Hawstone, Pa., Niles, Warren, Windham, O., Leslie, Md., Athens, Tex., $145; Morrisville, Pa., $148; Joliet, Ill., $151; Curtner, Calif., $163.

Semisilica Brick (per 1000)

Clearfield, Pa., $139; Philadelphia, $124; Woodbridge, N. J., $122.

Ladle Brick (per 1000)

Dry Pressed: Alsey, Ill., Chester, New Cumberland, W. Va., Freeport, Johnstown, Merrill Station, Pa., Mexico, Vandalia, Mo., $88.50; Wellsville, O., $92.50; Clearfield, Pa., Portsmouth, O., $98.

High-Alumina Brick (per 1000)

50 Per Cent: St. Louis, Mexico, Vandalia, Mo., $194; Danville, Ill., $197; Philadelphia, Clearfield, Pa., $201.

60 Per Cent: St. Louis, Mexico, Vandalia, Mo., $241; Danville, Ill., $244; Philadelphia, Clearfield, Pa., $248.

70 Per Cent: St. Louis, Mexico, Vandalia, Mo., $279 Danville, Ill., $281; Philadelphia, Clear field, Pa., $286.

Sleeves (per 1000)

Rossdale, Johnstown, Bridgeburg, Pa., $157; Clearfield, Pa., $158.80; St. Louis, $160.30.

Nozzles (per 1000)

Rossdale, Pa., $253.70; Johnstown, Pa., $259.20; Clearfield, Pa., $259.40; St. Louis $259.45; Bridgeburg, Pa. $258.

Runners (per 1000)

Rossdale, Johnstown, Bridgeburg, Pa., $196; Clearfield, Pa., $198; St. Louis, $196.80.

Dolomite (per net ton)

Domestic, dead-burned, bulk, Billmeyer, Blue Bell, Williams, Plymouth Meeting, York, Pa., Millville, W. Va., Bettsville, Millersville, Martin, Woodville, O., Gibsonburg, Narlo, O., $15; Thornton, McCook, Ill., $15.60; Dolly Siding, Bonne Terre, Mo., $14.

Magnesite (per net ton)

Domestic, dead-burned, bulk ⅛-in. grains with fines: Chewelah, Wash., $40; Luning, Nev., $40. ⅜-in grains with fines: Baltimore, $66.40.

Metallurgical Coke

Price per net ton

Beehive Ovens

Connellsville, furnace $13.75-14.50
Connellsville, foundry 16.00-17.00

Oven Foundry Coke

Birmingham, ovens $25.65
Cincinnati, deld. 30.58
Buffalo, ovens 27.50
Buffalo, deld. 28.75
Camden, N. J., ovens 26.50
Chicago, ovens 27.00
Detroit, ovens 27.50
Detroit, deld. 28.75
Pontiac, deld. 29.15
Saginaw, deld. 30.73
Erie, Pa., ovens 27.50
Everett, Mass., ovens
New England, deld. *28.55
Indianapolis, ovens 26.75
Ironton, O., ovens 26.00
Cincinnati, deld. 28.59
Kearny, N. J., ovens 26.75
Lone Star, Tex., ovens 19.50
Milwaukee, ovens 27.50
Neville Island, (Pittsburgh) Pa., ovens., 26.25
Painesville, O., ovens 27.50
Cleveland, deld. 29.43
Philadelphia, ovens 26.50
St. Louis, ovens 28.50
St. Paul, ovens 26.50
Swedeland, Pa., ovens 26.50
Terre Haute, Ind., ovens 26.75

*Or within $4.55 freight zone from works.

Coal Chemicals

Spot, cents per gallon, ovens

Pure benzene 36.50
Toluene, one deg. 32.00-34.00
Industrial xylene 32.00-35.00

Per ton, bulk, ovens

Ammonium sulfate $32.00
Birmingham area 26.00

Cents per pound, producing point

Phenol: Grade 1, 15.00; Grade 2-3, 14.50; Grade 4, 16.50; Grade 5, 15.25.

Fluorspar

Metallurgical grades, f.o.b. shipping point, In Ill., Ky., net tons, carloads, effective CaF_2 content 72.5%, $38-$39; 70%, $35-$36; 60% $31-$32. Imported, net tons, f.o.b. cars point of entry, duty paid, metallurgical grade: European, $34; Mexican, $26.50.

Electrodes

Threaded with nipple, unboxed, f.o.b. plant

GRAPHITE

Diam	Length	Per 100 lb
2	24	$52.50
2½	30	33.75
3	40	32.00
4	40	30.25
5½	40	30.00
6	60	27.25
7	60	26.75
8, 9, 10	60	24.25
12	72	27.25
14	60	23.50
16	72	22.50
17	60	23.00
18	72	22.50
20	72	22.25

CARBON

8	60	12.10
10	60	11.80
12	60	11.75
14	60	11.70
14	72	10.85
17	60	10.75
17	72	10.35
20	84	10.30
20	90	10.10
24	72, 84	10.30
24	96	10.05
30	84	10.20
40, 38	110	9.90
40	100	9.90

Coast are facing a severe supply shortage. Sellers in the Los Angeles area say the shortage may hold through the remainder of the year, though observers say the situation won't become critical unless the mills divert more semifinished steel to production of other finished steel products.

The U. S. Engineer at Seattle has received bids for four fuel storage tanks at Ft. Richardson, Alaska, involving about 1200 tons of plates. This project includes other construction. No large plate job is reported outstanding in the Pacific Northwest, but the supply situation in the area has not improved.

Plate production continues at the Alan Wood Steel Co. plant, Conshohocken, Pa., where contracts do not expire until the end of this month, and at the Harrisburg, Pa. mills of the Phoenix Iron & Steel Corp., division of Barium Steel Corp., where contracts expire at the end of August.

Warehouse . . .

Warehouse Prices, Page 137

At the end of June, warehouses experienced a flurry of activity, rushing shipments to fabricating mills before the June 30 strike deadline. Numerous fabricators expect to continue operations until at least July 30, when contracts of many fabricators expire.

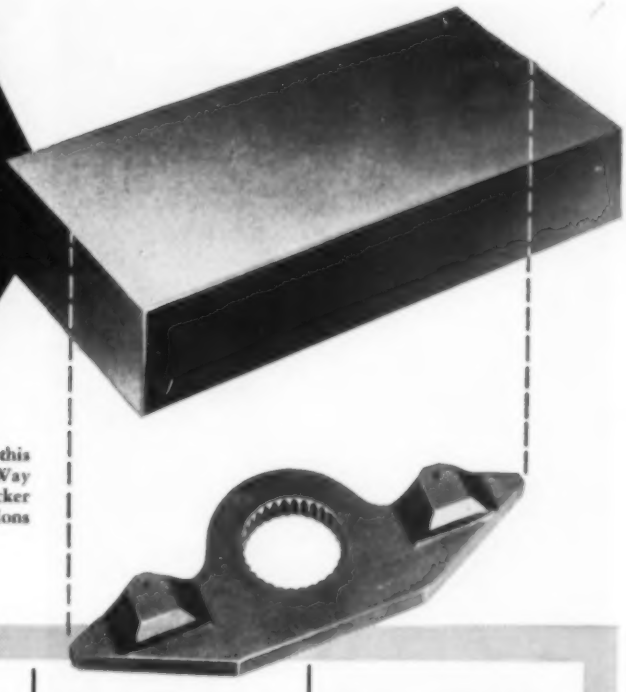
Sales were well spread out through June, and the month as a whole was better than May from a sales standpoint. However, mills hurried steel shipments to distributors during the last week of June. All products except structural shapes, plate and oil country tubing were in fairly easy supply.

Vacation schedules at many fabricating plants and the practical certainty of higher costs for warehouse steel will combine to slow sales in July. However, as late as July 1, distributors did not know how much July sales would trail June shipments.

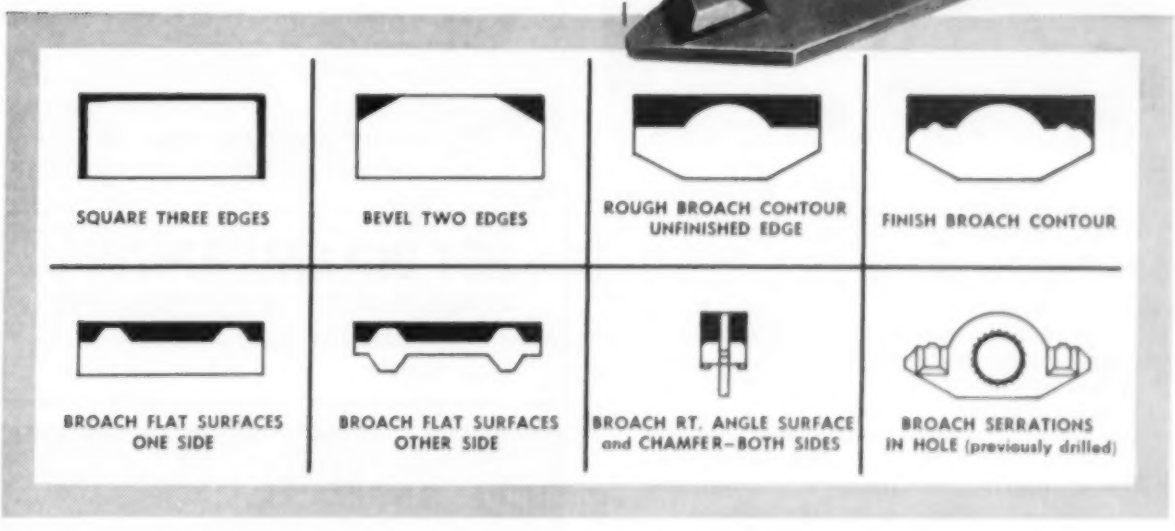
While many Philadelphia area steel consuming plants are down for vacations, the warehouses in the district are being pressed for tonnage now that most leading producers are strikebound. Distributors are taking measures against any "wild raiding" by mill customers.

Much the same situation prevails at the warehouses in other sections. On the whole, the warehouses hold fair stocks in the lighter products but have not been able to build up inventories of plates and shapes to any appreciable extent.

ROCKER ARM
machined from bar stock
in 8
BROACHING OPERATIONS



Broaching's all-round versatility is illustrated by this unusual adaptation of a standard American 3-Way broaching machine for the production of finished rocker arm part from bar stock. The eight broaching operations are shown in sequence below.


SQUARE THREE EDGES
BEVEL TWO EDGES
ROUGH BROACH CONTOUR UNFINISHED EDGE
FINISH BROACH CONTOUR
BROACH FLAT SURFACES ONE SIDE
BROACH FLAT SURFACES OTHER SIDE
BROACH RT. ANGLE SURFACE and CHAMFER–BOTH SIDES
BROACH SERRATIONS IN HOLE (previously drilled)

Small quantity production of this rocker arm part, plus a requirement that all surfaces be finished, made a forging impractical. Broaching gave the desired finish and confined the operations to one machine so that holding and locating fixtures were simplified.

American designed and built the broaches and had previously supplied the 3-Way vertical hydraulic broaching machine. But to American's good customer, The American Tool Co., Kalamazoo, Mich., goes the credit for the ingenuity displayed in developing the operation and building the interchangeable fixtures.

Whether you require eight operations on few parts, or one operation on thousands, the versatility of American broaches, fixtures and broaching machines can mean gains in your output, cuts in your costs. Give American the details; you'll receive a prompt recommendation.

ASK FOR CATALOG 450

AMERICAN **American BROACH & MACHINE CO.**

A DIVISION OF SUNDSTRAND MACHINE TOOL CO.

ANN ARBOR, MICHIGAN

SUNDSTRAND

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Machining practically eliminated with DRESSER WELDMENTS

Use of Dresser specialized ring-making facilities led to a 19% saving in cost, and a 31% reduction in weight for this generator frame.

If you can visualize your product as a combination of circular shapes, you may be in a position to produce a better product at less cost.

A generator frame, for example, used to be laboriously hogged out of a heavy cast cylinder to proper thickness and contours. Dresser now supplies complete frames made of four accurately formed and welded steel rings. Two rings are steel, of low magnetic permeability; two are mild steel. Machining is all but eliminated.

You can save machining time, speed production and cut scrap losses, too, by using Dresser Weldments. Send for catalog number 56-S. No obligation.

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- *Rings and Cylinders*—circular elements may also be combined into composite weldment.
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- *Shafts or Circular Parts Welded from Dissimilar Metals* — available with a portion of the part resistant to heat, corrosion or abrasion—or provided with greater strength or hard surface in a localized section.

We'll gladly make recommendations at no cost to you. Just send us your sketch or print.

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DRESSER WELDMENTS

Dresser Manufacturing Division

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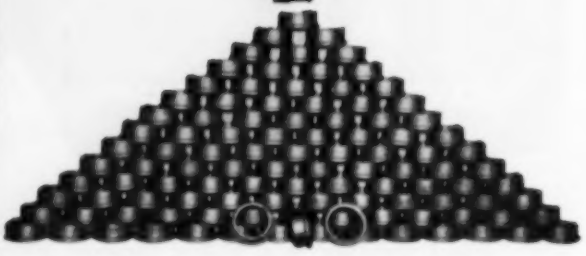
CASTINGS OF STAINLESS STEEL



Call Alloy Steel Casting Co. for heat and corrosion resistant stainless steel castings because:

- Pattern shop with new method for making duplicate patterns without dimensional shrinkage at half the cost
- Complete heat treating facilities
- Early delivery on 2 oz. to 500 lb. stainless steel castings
- Experienced foundry engineers

Write now or call for complete information.

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ALLOY STEEL CASTING CO.

Southampton, Pa. Telephone ELmwood 7-1565—1566

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STAINLESS PIPE & FITTINGS

SERVICE STEEL

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H&C Insert Chaser DIE HEADS

famous for accuracy and straightness of threads, low chaser costs, less downtime, more pieces per day.

THE EASTERN MACHINE SCREW CORP., 22-42 Barclay Street, New Haven, Conn.
Pacific Coast Representative: *A. C. Berbringer, Inc., 334 N. San Pedro St., Los Angeles, California.* Canada: *F. F. Barber Machinery Co., Toronto, Canada.*

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Current Ferroalloy Quotations

MANGANESE ALLOYS

Spiegeleisen: Carlot, per gross ton, Palmerton, Pa. 21-23% Mn, $96.50; 19-21% Mn, 1-3% Si, $94; 16-19% Mn, $92.

Standard Ferromanganese: (Mn 74-76%, C 7% approx.) Base price per net ton $215. Duquesne, Johnstown, Sheridan, Pa.; Philo, O.; Tacoma, Wash.; Alloy, W. Va.; Ashtabula, Marietta, O.; Sheffield, Ala.; Portland, Oreg. Add or subtract $2 for each 1% or fraction thereof of contained manganese over 76% or under 74%, respectively.

(Mn 79-81%). Lump $223 per net ton, f.o.b. Anaconda or Great Falls, Mont. Add $2.60 for each 1% above 81%; subtract $2.60 for each 1% below 79%, fractions in proportion to nearest 0.1%.

Low-Carbon Ferromanganese, Regular Grade: (Mn 85-90%). Carload, lump, bulk, max. 0.07% C, 31.95c per lb of contained Mn, carload packed 33c, ton lots 34.5c, less ton 35.7c. Delivered. Deduct 1.5c for max 0.15% C grade from above prices, 3c for max 0.30% C, 3.5c for max 0.50% C, and 6.5c for max 75% C—max 7% Si. **Special Grade:** (Mn 90% min, C 0.07% max, P 0.06% max). Add 2.05c to the above prices. Spot, add 0.25c.

Medium-Carbon Ferromanganese: (Mn 80-85%, C 1.25-1.5%, Si 1.5% max). Carload, lump, bulk 22.85c per lb of contained Mn, packed, carload 23.9c, ton lot 25.5c, less ton 26.7c. Delivered. Spot, add 0.25c.

Manganese Metal: 2" x D (Mn 95.5% min, Fe 2% max, Si 1% max, C 0.2% max). Carload, lump, bulk, 45c per lb of metal; packed, 45.75c; ton lot 47.25c; less ton lots 49.25c. Delivered. Spot, add 2c.

Electrolytic Manganese Metal: Min carload, 31.5c; 2000 lb to min carload, 33.5c; 250 lb to 1999 lb, 35.5c; less than 250 lb, 36.5c. Premium for hydrogen-removed metal, 0.75c per lb. Prices are f.o.b. cars, Knoxville, Tenn., freight allowed to St. Louis or to any point east of Mississippi; or f.o.b. Marietta, O. freight allowed.

Silicomanganese: (Mn 65-68%). Contract, lump, bulk 1.50% C grade, 18-20% Si, 12c per lb of alloy. Packed, c.l. 13c, ton 13.45c, less ton 14.45c, f.o.b. Alloy W. Va., Ashtabula, O., Marietta, O., Sheffield, Ala., Portland, Oreg. For 2% C grade, Si 15-17%, deduct 0.2c from above prices. For 3% C grade, Si 12-14.5%, deduct 0.4c from above prices. Spot, add 0.25c.

TITANIUM ALLOYS

Ferrotitanium, Low-Carbon: (Ti 20-25%, Al 3.5% max, Si 4% max, C 0.10% max). Contract, ton lot 2" x D, $1.50 per lb of contained Ti; less ton $1.55. (Ti 38-43%, Al 8% max, Si 4% max, C 0.10% max). Ton lot $1.35, less ton $1.37 f.o.b. Niagara Falls, N. Y., freight allowed to St. Louis. Spot, add 5c.

Ferrotitanium, High-Carbon: (Ti 15-18%, C 6-8%). Contract $200 per ton, f.o.b. Niagara Falls, N. Y., freight allowed to destinations east of Mississippi river and north of Baltimore and St. Louis.

Ferrotitanium, Medium-Carbon: (Ti 17-21%, C 2-4.5%). Contract $225 per ton, f.o.b. Niagara Falls, N. Y., freight not exceeding St. Louis rate allowed.

CHROMIUM ALLOYS

High-Carbon Ferrochrome: Contract, c.l., lump, bulk 26.25c per lb of contained Cr; c.l. packed 27.5c, ton lot 29.25c, less ton 30.65c. Delivered. Spot, add 0.25c.

Low-Carbon Ferrochrome: (Cr 67-71%). Contract, carload, lump, bulk, C 0.025% max (Simplex) 32.50c per lb contained Cr, 0.02% max 39.25c, 0.03% max 38.75c, 0.06% max 37.25c, 0.1% max 36.75c, 0.15% max 36.50c, 0.2% max 36.25c, 0.5% max 36.00c, 1.0% max 35.25c, 1.5% max 35.10c, 2.0% max 35.00c. Ton lot, add 3.1c, less ton add 4.8c. Carload packed add 1.45c. Delivered. Spot, add 0.25c.

Foundry Ferrochrome, High-Carbon: (Cr 62-66%, C 5-7%, Si 7-10%). Contract, c.l. 2 in. x D, bulk 27.4c per lb contained Cr. Packed, c.l. 28.7c, ton 30.5c less ton 32c. Delivered. Spot, add 0.25c.

Foundry Ferrosilicon Chrome: (Cr 50-54%, Si 28-32%, C 1.25% max). Contract, carload, packed 8 M x D, 19.6c per lb of alloy, ton lot 20.85c; less ton lot, 22.05c. Delivered. Spot, add 0.25c.

Low-Carbon Ferrochrome-Silicon: (Cr 39-41%, Si 42-49%, C 0.05% max). Contract, carload, lump, 4" x down and 2" x down, bulk, 39.05c per lb of contained Cr; 1" x down, bulk 39.8c. Delivered.

Chromium Metal, Electrolytic: Commercial grade (Cr 99.8% min, metallic basis, Fe 0.2% max). Contract, carlot, packed 2" x D plate (about ⅛" thick) $1.25 per lb, ton lots $1.27, less ton lots $1.29. Delivered. Spot, add 5c.

VANADIUM ALLOYS

Ferrovanadium: Open-hearth Grade (V 50-55%, Si 8% max., C 3% max). Contract, any quantity, $3.10 per lb of contained V. Delivered. Spot, add 10c. **Special Grade** (V 50-55% or 70-75%, Si 2% max, C 0.5% max) $3.20. **High Speed Grade** (V 50-55%, or 70-75%, Si 1.50% max, C 0.20% max) $3.30.

Grainal: Vanadium Grainal No. 1, $1.05 per lb; No. 6, 68c; No. 79, 50c, freight allowed.

Vanadium Oxide: Contract, less carload lots, packed, $1.33 per lb contained V_2O_5, freight allowed. Spot, add 5c.

SILICON ALLOYS

25-30% Ferrosilicon: Contract, carload, lump, bulk, 20.0c per lb of contained Si. Packed 21.40c; ton lot 22.50c f.o.b. Niagara Falls, N. Y., freight not exceeding St. Louis rate allowed.

50% Ferrosilicon: Contract, carload, lump, bulk, 12.75c per lb of contained Si. Packed, c.l. 14.85c, ton lot 16.3c, less ton 17.95c. F.o.b. Alloy, W. Va., Ashtabula, Marietta, O., Sheffield, Ala., and Portland, Oreg. Spot, add 0.45c.

Low Aluminum 50% Ferrosilicon: (Al 0.40% max). Add 1.2c to 50% ferrosilicon prices.

65% Ferrosilicon: Contract, carload, lump, bulk, 14.5c per pound contained silicon. Packed, c.l. 16.2c, ton lot, 18c; less ton, 19.35c. Delivered. Spot, add 0.35c.

75% Ferrosilicon: Contract, carload, lump, bulk, 15.4c per lb of contained Si. Packed, c.l. 17.05c, ton lot 18.7c, less ton 19.95c. Delivered. Spot, add 0.3c.

90% Ferrosilicon: Contract, carload, lump, bulk, 18.5c per lb of contained Si. Packed, c.l. 19.95c, ton lot 21.35c, less ton 22.4c. Delivered. Spot, add 0.25c.

Silicon Metal: (Min 98% Si, 0.75% max Fe, 0.07% max Ca). C.l. lump, bulk 20.5c per lb of Si. Packed, c.l. 21.95c, ton lot 23.25c, less ton 24.25c. Add 0.5c for max 0.03 Ca grade. Deduct 0.8c for max 2% Fe grade analyzing min 96.5% Si. Spot, add 0.25c.

Alsifer: (Approx. 20% Al, 40% Si, 40% Fe). Contract, basis f.o.b. Niagara Falls, N. Y., lump, carload, bulk, 10.65c per lb of alloy, ton lot, packed, 11.8c.

ZIRCONIUM ALLOYS

12-15% Zirconium Alloy: (Zr 12-15%, Si 39-43%, C 0.20% max). Contract, c.l. lump, bulk 8.5c per lb of alloy. Packed, c.l. 9.5c, ton lot 10.65c, less ton 11.5c. Delivered. Spot, add 0.25c.

35-40% Zirconium Alloy: (Zr 35-40%, Si 47-52%, Fe 8-12%, C 0.50% max). Contract, carload, lump, packed 26.25c per lb of alloy, ton lot 27.4c, less ton 28.65c. Freight allowed. Spot, add 0.25c.

BORON ALLOYS

Ferroboron: (B 17.50% min, Si 1.50% max, Al 0.50% max, C 0.50% max). Contract, 100 lb or more 1" x D, $1.20 per lb of alloy; less than 100 lb $1.30. Delivered. Spot, add 5c. F.o.b. Washington, Pa., prices, 100 lb and over, are as follows: Grade A (10-14% B) 85c per pound; Grade B (14-18% B) $1.20; Grade C (19% min B) $1.50.

Boral: (3 to 4% B, 40 to 45% Si). $5.25 per lb contained B, delivered to destination.

Borium: (B 1.5%-1.9%). Ton lots, 45c per lb; smaller lots, 50c per lb.

Carbortam: (B 1 to 2%). Contract, lump, carloads 9.50c per lb, f.o.b. Suspension Bridge, N. Y., freight allowed same as high-carbon ferrotitanium.

CALCIUM ALLOYS

Calcium-Manganese-Silicon: (Ca 16-20%, Mn 14-18% and Si 53-59%). Contract, carload, lump, bulk 22c per lb of alloy, carload packed 23.05c, ton lot 24.95c, less ton 25.95c. Delivered. Spot, add 0.25c.

Calcium-Silicon: (Ca 30-33%; Si 60-65%, Fe 1.5-3%). Contract, carload, lump, bulk 23.00c per lb of alloy, carload packed 24.45c, ton lot 26.75c, less ton 28.25c. Delivered. Spot, add 0.25c.

BRIQUETTED ALLOYS

Chromium Briquets: (Weighing approx. 3⅝ lb each and containing 2 lb of Cr). Contract, carload, bulk, 16.95c per lb of briquet, carload packed in box pallets 17.15c, in bags 17.85c; 3000 lb to c.l. in box pallets 18.35c; 2000 lb to c.l. in bags 19.05c; less than 2000 lb in bags 19.95c. Delivered. Add 0.25c for notching. Spot, add 0.25c.

Ferromanganese Briquets: (Weighing approx. 3 lb and containing 2 lb of Mn). Contract, carload, bulk 13c per lb of briquet, c.l. packed, pallets 13.2c, bags 14c; 3000 lb to c.l., pallets 14.4c; 2000 lb to c.l. bags, 15.2c, less ton 16.1c. Delivered. Add 0.25c for notching. Spot, add 0.25c.

Silicomanganese Briquets: (Weighing approx. 3⅛ lb and containing 2 lb of Mn and approx. ⅛ lb of Si). Contract, c.l. bulk 13.55c per lb of briquet, c.l. packed, pallets, 13.75c; bags 14.55c, 3000 lb to c.l., pallets, 14.95c; 2000 lb to c.l., bags, 15.75c; less ton 16.65c. Delivered. Add 0.25c for notching. Spot, add 0.25c.

Silicon Briquets: (Large size—weighing approx. 5 lb and containing 2 lb of Si). Contract, carload, bulk 7.15c per lb of briquet; packed, pallets, 7.35c; bags 8.15c; 3000 lb to c.l., pallets, 8.95c; 2000 lb to c.l. bags 9.75c; less ton 10.65c. Delivered. Spot, add 0.25c.

(Small size—Weighing approx. 2¼ lb and containing 1 lb of Si). Carload, bulk 7.3c. Packed, pallets 7.5c; bags 8.30c; 3000 lb to c.l. pallets 9.1c; 2000 lb to c.l. bags 9.9c; less ton 10.8c. Delivered. Add 0.25c for notching, small size only. Spot, add 0.25c.

Molybdic-Oxide Briquets: (Containing 2½ lb of Mo each) $1.33 per pound of Mo contained, f.o.b. Langeloth, Pa.

TUNGSTEN ALLOYS

Ferrotungsten: (70-80%), 5000 lb W or more $3.45 per lb of contained W; 2000 lb W to 5000 lb W, $3.55; less than 2000 lb W, $3.67. Delivered.

OTHER FERROALLOYS

Ferrocolumbium: (Cb 50-60%, Si 8% max, C 0.4% max). Contract, ton lot, 2" x D, $6.90 per lb of contained Cb. Delivered. Spot, add 10c

Ferrotantalum—Columbium: (Cb 40% approx., Ta 20% approx., and Cb plus Ta 60% min C 0.30% max). Ton lots, 2" x D, $4.65 per lb of contained Cb plus Ta, delivered; less ton lots $4.70.

SMZ Alloy: (Si 60-65%, Mn 5-7%, Zr 5-7%, Fe 20% approx.) Contract, c.l. packed ¼ in. x 12 M, 18.5c per lb of alloy, ton lots 19.65c, less ton 20.9c. Delivered. Spot, add 0.25c.

Graphidox No. 5: (Si 48-52%, Ca 5-7%, Ti 9-11%). C.l. packed, 18.5c per lb of alloy, ton lots 19.65c; less ton lots 20.9c, f.o.b. Niagara Falls, N. Y.; freight allowed to St. Louis.

V-5 Foundry Alloy: (Cr 38-42%, Si 17-19%, Mn 8-11%). C.l. packed 17.2c per lb of alloy; ton lots 18.7c; less ton lots 19.95c, f.o.b. Niagara Falls, N. Y., freight allowed to St. Louis.

Simanal: (Approx. 20% each Si, Mn, Al; bal. Fe). Lump, carload, bulk 17.50c. Packed c.l. 18.50c, 2000 lb to c.l. 19.50c, less than 2000 lb 20c per lb of alloy. Delivered.

Ferrophosphorus: (23-25% based on 24% P content with unitage of $4 for each 1% of P above or below the base); carload, f.o.b. sellers' works, Mt. Pleasant, Elgin, Tenn., $90 per gross ton.

Ferromolybdenum: (55-75%). Per lb contained Mo, in 200-lb containers, f.o.b. Langeloth, Pa., $1.54 in all sizes except powdered which is $1.66; Washington, Pa., furnace, any quantity $1.46.

Technical Molybdic-Oxide: Per lb contained Mo, f.o.b. Langeloth, Pa.; $1.31 in cans; in bags, $1.30, f.o.b. Langeloth, Pa.; $1.24, Washington, Pa.

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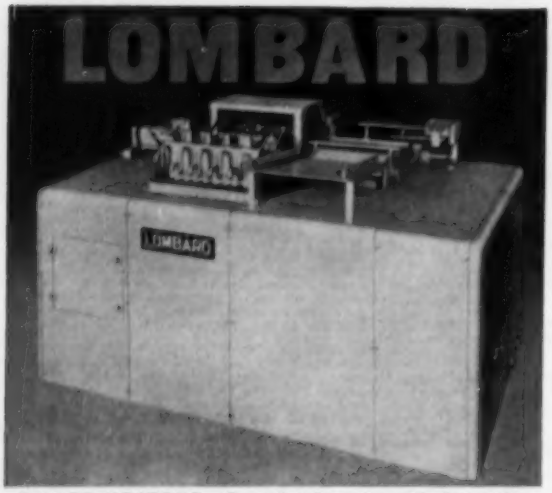

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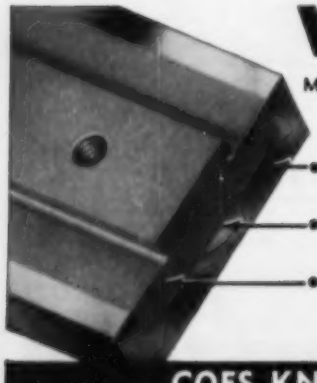

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Scrap . . .

Scrap Prices, Page 150

Pittsburgh — Prices are largely nominal as steelmakers generally hold large stocks. They and the uncertainty about third quarter steel operations have brought No. 1 heavy melting scrap shipments to a standstill since June 30.

Several small electric furnace operators in this area are continuing production because their contracts do not expire until July 31. Their purchases of scrap are limited by vacation schedules and declining demand for steel.

There seems to be a standstill on everything but some electric furnace grades. Pittsburgh Steel Co. reported it had better than a 60-day supply, adding that it would have no incentive to buy scrap during the strike unless it could pick up tonnage at rock-bottom prices.

Philadelphia—While prices on major grades of steel scrap are off a little, the market still maintains considerable strength despite cessation of operations at various mills due to the strike. Some plants are still consuming scrap as their labor contracts do not expire at this time. Some that are strikebound are storing scrap at points outside mill properties.

Further, collections of dealer scrap are light with various yards closed down for vacations. Industrial scrap also is coming out slowly because of suspensions at a number of metalworking plants for the same reason.

Cleveland—Although there is no new buying, the scrap market in this area is not entirely lifeless. One of the large mills is laying down scrap in a dealer's yard against old orders. One or two small Ohio mills are not affected by the strike and are still taking in scrap. In the absence of new buying, prices are unchanged. Brokers and dealers look for a rise in the market once the steel strike is settled and the large mills resume active buying. Bids on the latest automotive lists, around $48 for bundles, provide a tipoff of underlying market strength.

New York—Scrap brokers have advanced their prices on machine shop turnings to $21-$22 and have reduced their offerings on short shoveling turnings to $26-$27. Prices on other grades are unchanged, with some business coming out from the mills still in operation and from exporters.

Buffalo—The steel mills here embargoed shipments with the approach of the strike deadline. Trading in scrap came to a virtual standstill. Prices are nominal in the absence of transactions. A prolonged strike will likely force prices lower as supplies accumulate.

Boston—Steel scrap prices are marking time. Shipments to the heavy consuming centers have been halted. Buying for export is heavier, three vessels loading with brokers paying $40 for No. 1 heavy melting. Brokers are paying $38 for No. 1 steel, within the $6 freight zone for one district consuming mill that's still in operation. Cast iron shipments are at a standstill.

Cincinnati—Scrap prices are holding here, pending developments in the steel strike. Brokers claim they detect underlying strength, but the market lacks a test.

Chicago—Start of the steel strike has brought the scrap market to a virtual standstill. Shipments tapered off sharply late in June as the mills placed a cutoff date on intake. Five or six mills in the Midwest continue to operate and are in a position to purchase scrap, but their total requirements are only a drop in the bucket.

For the past two weeks, the scrap market has been weak although prices have held steady. The new conditions brought on by the strike will work toward further weakening. Closing of foundries for vacations is putting the cast grades in the doldrums, too.

St. Louis—Scrap is marking time here. Little has been sold the last few days, but little tonnage is available. Now that there is no prospect of a strike at the mill in this area, some dealers are hoping for a gradual price rise. What scrap that was sold last week reflects the same price picture as the week preceding.

Birmingham—Although there is no buying of open-hearth scrap here, electric furnace grades and specialties are moving, with lower prices reported on a few items. The cast iron market continues to be active. Exports are steady, several vessels reported being loaded at South Atlantic and Gulf ports.

Los Angeles—Scrap prices have advanced an average of nearly $4 a ton. No. 1 heavy melting moved from $37 to $41; No. 2 heavy melting from $32 to $37; machine shop turnings from $17 to $21; No. 1 bundles from $37 to $40; No. 2 bundles from $28 to $30; and No. 1 cupola from $42 to $46, with some sales reported at $48.

Seattle—Practically no buying of scrap is reported. Prices are nominal, with the trade awaiting a turn in the general steel picture. Following an extremely active quarter, foreign buyers are holding off until the future market trend is indicated.

Metallurgical Coke . . .

Metallurgical Coke Prices, Page 144

Peoples Gas Light & Coke Co., Chicago, has shut down its coke ovens and no longer will produce foundry and blast furnace coke. Miller & Co., its sales agent for foundry coke, will continue to serve customers with coke obtained from other sources.

With cessation of this operation, no foundry coke is being produced in the Chicago area. Closest sources are Milwaukee, Indianapolis and Terre Haute, Ind. Some coke may be shipped into the area from as far away as Alabama.

Some time ago Peoples Gas advised customers it planned to withdraw from the coke market about July 1, the date when the company would have no further need for manufactured gas.

Late in May the company announced it would begin supplying domestic users of gas in Chicago with 100 per cent natural gas about July 1. For some time, the gas supplied has been about 90 per cent natural and 10 per cent manufactured. The proportion of manufactured gas has decreased over the years as more natural gas became available.

The company has canceled contracts with Youngstown Sheet & Tube Co., Republic Steel Corp. and Interlake Iron Corp. for the purchase of surplus coke oven gas.

Peoples Gas has conducted a coke oven operation for 35 years and had three batteries of Koppers ovens. Two of these, 50 ovens each, were old, and last operated about two years ago. The third battery of 51 ovens was built in 1948 at a cost of $4.6 million.

Pig Iron . . . .

Pig Iron Prices, Page 137

United States Pipe & Foundry Co., Birmingham, increased pig iron prices, $4 per ton effective July 2.

Prices per gross ton for basic grade (1.76-2.25 per cent silicon) pig iron, f.o.b. cars furnaces, Birmingham, are: Regular grade (0.70-0.90 phosphorus), $59; intermediate grade (0.31-0.70 phosphorus), $60; and malleable grade (0.30 and lower phosphorus), $63. Usual silicon and manganese differentials remain unchanged.

The company's contract with the union does not expire for some weeks, it is understood. Its blast furnace operations are not affected by the steel strike.

It is thought in the trade that the price increase is protection against higher costs expected to result when a contract settlement is reached.

(Please turn to page 152)

Iron and Steel Scrap

Consumer prices, per gross ton, except as otherwise noted, including broker's commission, as reported to STEEL. *Changes shown in italics.*

STEELMAKING SCRAP COMPOSITE

July 3	$45.83
June 27	46.00
June Avg.	46.04
July 1955	39.67
July 1951	44.00

Based on No. 1 heavy melting grade at Pittsburgh, Chicago and eastern Pennsylvania.

PITTSBURGH

No. 1 heavy melting	44.00-45.00
No. 2 heavy melting	39.00-40.00
No. 1 bundles	44.00-45.00
No. 2 bundles	36.00-37.00
No. 1 busheling	44.00-45.00
Machine shop turnings	32.00-33.00
Mixed borings, turnings	32.00-33.00
Short shovel turnings	36.00-37.00
Cast iron borings	36.00-37.00
Cut structurals, 3 ft lengths	50.00-51.00
Heavy turnings	42.00-43.00
Punchings & plate scrap	50.00-51.00
Electric furnace bundles	50.00-51.00

Cast Iron Grades

No. 1 cupola	48.00-49.00
Charging box cast	44.00-45.00
Heavy breakable cast	44.00-45.00
Unstripped motor blocks	32.00-33.00
No. 1 machinery cast	54.00-55.00

Railroad Scrap

No. 1 R.R. heavy melt	51.50-52.50
Rails, 2 ft and under	65.00-66.00
Rails, 18 in. and under	66.00-67.00
Rails, random lengths	61.00-62.00
Railroad specialties	59.00-60.00

Stainless Steel Scrap

18-8 bundles & solids	360.00-375.00
18-8 turnings	255.00-270.00
430 bundles & solids	110.00-120.00
430 turnings	60.00-65.00

CLEVELAND

No. 1 heavy melting	42.00-43.00
No. 2 heavy melting	33.00-34.00
No. 1 bundles	42.00-43.00
No. 2 bundles	30.00-31.00
No. 1 busheling	42.00-43.00
Machine shop turnings	25.00-26.00
Mixed borings, turnings	29.00-30.00
Short shovel turnings	29.00-30.00
Cast iron borings	29.00-30.00
Low phos.	44.00-45.00
Cut structural plates 2 ft and under	51.00-52.00
Alloy free, short shovel turnings	37.00-38.00
Electric furnace bundles	42.00-43.00

Cast Iron Grades

No. 1 cupola	52.00-53.00
Charging box cast	38.00-39.00
Heavy breakable cast	42.00-43.00
Stove plate	49.00-50.00
Unstripped motor blocks	27.00-28.00
Brake shoes	37.00-38.00
Clean auto cast	50.00-51.00
Burnt cast	37.00-38.00
Drop broken machinery	53.00-54.00

Railroad Scrap

No. 1 R.R. heavy melt	49.00-50.00
R.R. malleable	54.00-55.00
Rails, 2 ft and under	62.50-63.50
Rails, 18 in. and under	61.00-62.00
Rails, random lengths	57.00-58.00
Cast steel	51.00-52.00
Railroad specialties	51.00-52.00
Uncut tires	52.00-53.00
Angles, splice bars	57.00-58.00
Rails, rerolling	61.00-62.00

Stainless Steel

(Brokers' buying prices; f.o.b. shipping point)

18-8 bundles, solids	345.00-355.00
18-8 turnings	205.00-215.00
430 clips, bundles, solids	100.00-110.00
430 turnings	50.00-60.00

YOUNGSTOWN

No. 1 heavy melting	44.00-45.00
No. 2 heavy melting	33.00-34.00
No. 1 bundles	44.00-45.00
No. 2 bundles	31.00-32.00
No. 1 busheling	44.00-45.00
Machine shop turnings	26.00-27.00
Short shovel turnings	31.00-32.00
Cast iron borings	31.00-32.00
Low phos.	45.00-46.00
Electric furnace bundles	44.00-45.00

Railroad Scrap

No. 1 R.R. heavy melt	51.00-52.00

CHICAGO

No. 1 heavy melting	44.00-45.00
No. 2 heavy melting	36.00-37.00
No. 1 factory bundles	45.00-46.00
No. 1 dealer bundles	44.00-45.00
No. 2 bundles	33.00-34.00
No. 1 busheling	44.00-45.00
Machine shop turnings	23.00-24.00
Mixed borings, turnings	25.00-26.00
Short shovel turnings	25.00-26.00
Cast iron borings	25.00-26.00
Cut structurals, 2 ft	52.00-53.00
Punchings & plate scrap	53.00-54.00

Cast Iron Grades

No. 1 cupola	45.00-46.00
Stove plate	39.00-40.00
Unstripped motor blocks	32.00-33.00
Clean auto cast	47.00-48.00
Drop broken machinery	47.00-48.00

Railroad Scrap

No. 1. R.R. heavy melt	49.00-50.00
R.R. malleable	58.00-59.00
Rails, 2 ft and under	65.00-66.00
Rails, 18 in. and under	66.00-67.00
Angles, splice bars	62.00-63.00
Rails, rerolling	66.00-67.00

Stainless Steel Scrap

18-8 bundles & solids	380.00-395.00
18-8 turnings	270.00-280.00
430 bundles & solids	105.00-110.00
430 turnings	55.00-60.00

DETROIT

(Brokers' buying prices; f.o.b. shipping point)

No. 1 heavy melting	38.00
No. 2 heavy melting	32.00
No. 1 bundles	39.00
No. 2 bundles	27.50
No. 1 busheling	38.00
Machine shop turnings	23.00
Mixed borings, turnings	23.00
Short shovel turnings	27.00
Punchings & plate scrap	58.00

Cast Iron Grades

No. 1 cupola	46.00
Charging box cast	38.00
Stove plate	38.00
Heavy breakable	38.00
Unstripped motor blocks	25.00
Clean auto cast	51.00
Malleable	51.00

BIRMINGHAM

No. 1 heavy melting	34.00-35.00
No. 2 heavy melting	32.00-33.00
No. 1 bundles	34.00-35.00
No. 2 bundles	24.00-25.00
No. 1 busheling	34.00-35.00
Cast iron borings	20.00-21.00
Short shovel turnings	27.00-28.00
Machine shop turnings	25.00-26.00
Electric furnace bundles	*39.00-40.00*

Cast Iron Grades (F.o.b. shipping point)

No. 1 cupola	48.50-49.50
Stove plate	47.00-48.00
Bar crops and plate	51.00-52.00
Structural & plate, 2 ft	49.00-50.00
Unstripped motor blocks	37.50-38.50
Charging box cast	32.00-33.00
No. 1 wheels	39.00-40.00

Railroad Scrap

No. 1 R.R. heavy melt	45.00-46.00
Rails, 18 in. and under	*59.00-60.00*
Rails, rerolling	64.00-65.00
Rails, random lengths	*54.00-55.00*
Angles, splice bars	*54.00-55.00*

PHILADELPHIA

No. 1 heavy melting	*46.00-48.00*
No. 2 heavy melting	*38.00*
No. 1 bundles	*46.00-48.00*
No. 2 bundles	*37.00*
No. 1 busheling	*46.00-48.00*
Electric furnace bundles	50.00
Mixed borings, turnings	34.00
Machine shop turnings	*32.00*
Short shovel turnings	*36.00-37.00*
Heavy turnings	*41.00*
Structurals & plates	51.00-53.00
Couplers, springs, wheels	60.00
Rail crops, 2 ft & under	64.00

Cast Iron Grades

No. 1 cupola	48.00
Malleable	67.00
Heavy breakable cast	52.00
Drop broken machinery	54.00-56.00

NEW YORK

(Brokers' buying prices)

No. 1 heavy mbelting	41.00-42.00
No. 2 heavy melting	32.00-33.00
No. 1 bundles	41.00-42.00
No. 2 bundles	30.00-31.00
Machine shop turnings	*21.00-22.00*
Mixed borings, turnings	26.00-27.00
Short shovel turnings	*26.00-27.00*
Low phos. (structural & plate)	44.00-45.00

Cast Iron Grades

No. 1 cupola	44.00-45.00
Unstripped motor blocks	32.00-34.00
Heavy breakable	44.00-45.00

Stainless Steel

18-8 sheets, clips, solids	340.00-350.00
18-8 borings, turnings	170.00-180.00
430 sheets, clips, solids	120.00-125.00
410 sheets, clips, solids	100.00-105.00

BOSTON

(Brokers' buying prices; f.o.b. shipping point)

No. 1 heavy melting	36.00-36.50
No. 2 heavy melting	26.00-26.50
No. 1 bundles	36.00-36.50
No. 2 bundles	25.00-25.50
No. 1 busheling	36.00-36.50
Machine shop turnings	20.00-20.50
Mixed borings, turnings	23.00-23.50
Short shovel turnings	24.00-24.50
No. 1 cast	42.00-42.50
Mixed cupola cast	37.50-38.00
No. 1 machinery cast	43.50-44.00

BUFFALO

No. 1 heavy melting	42.00-43.00
No. 2 heavy melting	33.00-34.00
No. 1 bundles	42.00-43.00
No. 2 bundles	30.00-31.00
No. 1 busheling	42.00-43.00
Mixed borings, turings	27.00-28.00
Machine shop turnings	25.00-26.00
Short shovel turnings	28.00-29.00
Cast iron borings	27.00-28.00
Low phos.	50.00-51.00

Cast Iron Grades (F.o.b. shipping point)

No. 1 cupola	45.00-46.00
No. 1 machinery	50.00-51.00

Railroad Scrap

Rails, random lengths	54.00-55.00
Rails,3 ft and under	59.00-60.00
Railroad specialties	50.00-51.00

CINCINNATI

(Brokers' buying prices; f.o.b. shipping point)

No. 1 heavy melting	42.00-43.00
No. 2 heavy melting	33.50-34.50
No. 1 bundles	42.00-43.00
No. 2 bundles	30.00-31.00
No. 1 busheling	42.00-43.00
Machine shop turnings	24.00-25.00
Mixed borings, turnings	28.00-29.00
Short shovel turnings	28.00-29.00
Cast iron borings	28.00-29.00
Low phos., 18 in.	51.00-52.00

Cast Iron Grades

No. 1 cupola	43.00-44.00
Heavy breakable cast	43.00-44.00
Craging box cast	43.00-44.00
Drop broken machinery	53.00-54.00

Railroad Scrap

No. 1 R.R. heavy melt	49.00-50.00
Rails, 18 in. and under	65.00-66.00
Rails, random lengths	58.00-59.00

ST. LOUIS

(Brokers' buying prices)

No. 1 heavy melting	36.00
No. 2 heavy melting	34.00
No. 1 bundles	36.00
No. 2 bundles	30.00
No. 1 busheling	36.00
Machine shop turnings	†
Short shovel turnings	28.00

Cast Iron Grades

No. 1 cupola	44.00
Charging box cast	39.00
Heavy breakable cast	39.00
Unstripped motor blocks	39.00
Brake shoes	42.00
Clean auto cast	45.00
Stove plate	38.00

Railroad Scrap

No. 1 R.R. heavy melt	49.50
Rails, 18 in. and under	62.00
Rails, random lengths	56.00
Rails, rerolling	70.00
Angles, splice bars	53.50

†Nominal

SEATTLE

No. 1 heavy melting	43.00-44.00
No. 2 heavy melting	39.00-40.00
No. 1 bundles	39.00-40.00
No. 2 bundles	30.00-31.00
No. 3 bundles	20.00
Machine shop turnings	23.00-25.00
Mixed borings, turnings	23.00-25.00
Electric furnace No. 1	52.00-54.00

Cast Iron Grades (F.o.b. shipping point)

No. 1 cupola	42.00-45.00
Heavy breakable cast	36.00-38.00
No. 1 wheels	37.00
Unstripped motor blocks	40.00
Stove plate (f.o.b. plant)	30.00-31.00
Brake shoes	38.00

Railroad Scrap

Rails, random lengths	43.00-44.00

LOS ANGELES

No. 1 heavy melting	*41.00*
No. 2 heavy melting	*37.00*
No. 1 bundles	*40.00*
No. 2 bundles	*30.00*
Machine shop turnings	*21.00*

Cast Iron Grades (F.o.b. shipping point)

No. 1 Cupola	*46.00*

SAN FRANCISCO

No. 1 heavy melting	43.00
No. 2 heavy melting	40.00
No. 1 bundles	42.00
No. 2 bundles	35.00
Machine shop turnings	20.00-23.00
Mixed borings, turnings	20.00-23.00
Cast iron borings	20.00-23.00
Heavy turnings	20.00-23.00
Short shovel turnings	25.00
Cut structurals	45.00
Punchings & plate scrap	44.00

Cast Iron Grades

No. 1 cupola	48.00
Charging box cast	42.00
Stove plate	39.00
Heavy breakable cast	39.00
Unstripped motor blocks	38.00
Brake shoes	35.00
Clean auto cast	48.00
No. 1 wheels	39.00
Burnt cast	23.00
Drop broken machinery	50.00

HAMILTON, ONT

No. 1 heavy melting	43.00
No. 2 heavy melting	38.00
No. 1 bundles	43.00
No. 2 bundles	35.50
Mixed steel scrap	37.00
Busheling, new factory: Prepared	41.00
Unprepared	37.00
Short steel turnings	28.00

Cast Iron Grades†

No. 1 machinery cast	50.00

†F.o.b., shipping point.

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Part of extensive Logan System in brass mill. Roller Conveyor loop serves as coil storage ahead of pickler served by Downender in foreground. Coils are fed to storage line by Vertical Reciprocating Conveyor at right.
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DETROIT TRANSMISSION DIV.
DE VILBISS CO.
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DOW CHEMICAL CO.
EASTMAN KODAK CO.
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FLINTKOTE CO.
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LOGAN CO., 535 CABEL ST., LOUISVILLE 6, KY.

Logan Conveyors

(Concluded from page 149)

Southern pig iron prices did not rise last March when northern iron prices were advanced $1.50 per ton.

Shipments of pig iron in June were abnormally high. Foundries raised their orders significantly as a hedge against blast furnace closings as a result of the steelworkers' strike and the almost certain price increases to come as soon as a settlement is reached.

A record blast furnace slag tonnage was processed last year. Production was 32,438,017 short tons valued at $46,307,898, reports the Bureau of Mines. This compared with 29,235,142 tons worth $39,476,408 in 1954. Slag processors recovered 376,995 short tons of iron against 302,000 in 1954.

Screened air-cooled slag increased 11 per cent to 24,900,883 short tons valued at $36,131,615.

Output of unscreened air-cooled slag was 809,461 tons valued at $596,540. About 91 per cent was used in highway and airport construction. Granulated slag totaled 3,835,829 tons, of which 44 per cent was used in hydraulic cement, 42 per cent in highway construction and the remainder in concrete blocks, agricultural slag and liming, and miscellaneous uses. Production of expanded slag was 2,891,844 tons valued at $7,961,466.

Stockholders of Interlake Iron Corp., Cleveland, last week approved a proposal to acquire the assets of Globe Iron Co., Jackson, O., in exchange for Interlake stock.

While most blast furnaces are down because of the strike, the two stacks at Swedeland, Pa., continue in operation under a union contract that does not expire until the end of July. The furnace at Chester, Pa., is under a contract that does not expire until the end of August. The North Tonawanda, N. Y., furnace has a contract that does not expire until the end of the year. Some blast furnace production also continues in the South, notably at the plants of United States Pipe & Foundry Co. and Woodward Iron Co. The Birdsboro, Pa., stack of the Colorado Fuel & Iron Corp., E. & G. Brooke Division, also is operating.

Structural Shapes . . .

Structural Shape Prices, Page 132

Construction firms depending on structural shape supply were already suffering from a shortage of I-beams and wide-flange structurals when the steel strike was called July 1. Generally, they hold supplies of about two weeks, and a slowdown

in shipments will cause serious interruptions.

On the brighter side, several large bridge builders have been able to accumulate enough steel to support operations for at least a month. A rush of mill shipments late in June helped their inventory position considerably.

The Austin Co., prime contractor for Boeing Airplane Co.'s office and manufacturing facility at Renton, Wash., recently placed these subcontracts for structural steel: High bay manufacturing area, 1720 tons to Bethlehem Pacific Coast Steel Corp., Seattle; low bay manufacturing area, 830 tons to Isaacson Iron Works, Seattle; office building, 335 tons to Pacific Car & Foundry Co., Seattle.

Work on the Chrysler Corp.'s new plant near Hudson, O., which requires 26,000 tons of structurals, will be seriously held up if the steel strike is prolonged. Fabricated steel has been slow in arriving, and the mill tieup will add to fabricators' difficulties.

Some construction in the East already has been halted because of the shortage of fabricated steel. Some leading area fabricators are beginning to curtail operations sharply due to lack of plain material.

The shape mill and fabricating shops of the Phoenix Iron & Steel Co. at Phoenixville, Pa., continue to operate under contracts which do not expire until the end of August. Two fabricating shops of the American Bridge Division, U. S. Steel Corp., continue in operation, one at Elmira, N. Y., which operates under an AFL contract, and the other at Orange, Tex.

While some structural projects are up for figures, awards are at a virtual standstill.

STRUCTURAL SHAPES . . .

STRUCTURAL STEEL PLACED

1720 tons, Boeing manufacturing facility, Renton, Wash., to Bethlehem Pacific Coast Steel Corp., Seattle, by the Austin Co., Seattle.

1120 tons, additions and facilities, Bridgeport Hospital, Bridgeport, Conn., to Schacht Steel Construction Co., New York, through E. & F. Construction Co., Bridgeport, general contractor.

830 tons, Boeing plant, Renton, Wash., to Isaacson Iron Works, Seattle; the Austin Co., Seattle, prime contractor.

335 tons, office building, Boeing Airplane Co., Renton, Wash., to Pacific Car & Foundry Co., Seattle; the Austin Co., Seattle, is prime contractor.

200 tons, central heating and cooling plant, Rice Institute, Houston, through Brown & Root Inc., that city, to Peden Iron & Steel Co.

165 tons, mill addition, Cluett, Peabody & Co., Inc., Leominster, Mass., to Antonelli Iron Works, Quincy, Mass., through Morton C. Tuttle Co., Boston, general contractor.

100 tons, structurals and bars, dormitory, state school, Brandon, Vt., to Vermont Structural Steel Co., Burlington, Vt., and Mohawk Steel Co., Albany, N. Y., through

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160" Niles vtl. Boring Mill—1942 w/2 swiveling rail heads and side head, hydraulic feed. Main drive motor—50 HP.
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VERT Boring Mills from 27"-16"-14"-13"-10"-9"-8"-7"-16 24"
HORIZ Boring Mills from 13" flr. type to 2" & 5" tabl
5" Univ. Horiz. Boring Mill, HI-spd. w/thread. att.
11B Beatty hvy-duty 350 ton punch—1945
9"—Nat'l. Upsetter w/air clutch, '49
Newton 42" Cold Saw w/Hyd. Control
15' x 10' x 36' Betts Hvy-duty Planer
42" x 168" Niles hvy-duty geared head Lathe w/profiling att., 1943
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16' x ⅝" cap. Birdsboro Brake, '40

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Carroll, Verge & Whipple Inc., Pittsfield, Mass., general contractor.

STRUCTURAL STEEL PENDING

450 tons, municipal sewage plant, Torresdale, Philadephia; bids July 17.

Unstated, inflammable storehouse, Eielson Air Field, Alaska; Fairbanks Builders Inc., Fairbanks, Alaska, low at $194,800 to U. S. Engineer.

Unstated, high school; bids to Eugene, Oreg., July 6.

Unstated, $925,000 plant for Container Corp. of America, Renton, Wash.; bids July 12; John Graham & Son, Seattle, architect.

Unstated, hangar, and other installations, Ft. Richardson, Alaska; bids to U. S. Engineer, Anchorage, Alaska.

REINFORCING BARS . . .

REINFORCING BARS PLACED

1200 tons, 17-story office and parking garage, Graver Improvement Co., New Orleans, La., through R. P. Farnsworth & Co., Inc., New Orleans, general contractor.

880 tons, wing for General Hospital, Norfolk, Va., to Hall-Hodges Co., Norfolk, through Doyle & Russell, Norfolk, general contractors; structural steel, Globe Iron Works, Norfolk.

310 tons, additions and facilities, Bridgeport Hospital, Bridgeport, Conn., to Fireproof Products Inc., New York, through E. & F. Construction Co., Bridgeport, general contractor.

300 tons, four dormitories, Divinity School, Yale University, New Haven, Conn., to Concrete Steel Co., Boston, through George B. H. Macomber Co., Boston, general contractor.

520 tons, Boeing Airplane Co. facility, Renton, Wash., to Northwest Steel Rolling Mills Inc., Seattle; the Austin Co., Seattle general contractor.

REINFORCING BARS PENDING

300 tons, Washington state, box girder bridge, Thurston county; bids to Olympia, Wash., July 17.

200 tons, Washington state steel truss bridge, Snohomish county; bids to Olympia, Wash., July 17.

80 tons, plus miscellaneous, Washington state, Whatcom county bridge; general contract to E. Selene & Sons, Bellingham, Wash., low at $99,895.

70 tons, plus other metals, Washington state, two rigid frame bridges, Thurston county; bids to Olympia, Wash., July 17.

50 tons, plus miscellaneous, three pumping plants near Pasco, Wash.; bids to the Bureau of Reclamation, Ephrata, Wash., Aug. 2.

Unstated, barracks and other construction, Ft. Lewis, Wash.; Donald M. Drake Co., Portland, Oreg., is low at $6,446,404 to U. S. Engineer.

Unstated, office building, P.U.D. No. 1, Everett, Wash.; Wick Construction Co., Seattle, is low at $460,000.

Unstated, Oregon state bridges, Marion and Umatilla counties; bids to Portland, Oreg., July 12 and 13, respectively.

PLATES . . .

PLATES PLACED

100 tons plus, water storage tank, Coquille, Oreg., to American Pipe & Construction Co., Portland, Oreg.

PLATES PENDING

1200 tons, four storage tanks, Ft. Richardson, Alaska; bids in.

PIPE . . .

CAST IRON PIPE PENDING

140 tons, 12 and 6-in.; bids to Alma K. Catto, clerk, Shelton, Wash., July 10.

100 tons, 4000 ft, 8-in.; bids to E. H. T. McGowan, clerk, Bremerton, Wash., July 11.

STEEL PIPE PENDING

Unstated, 6600 ft, 20-in.; bids to Port Townsend, Wash., July 17.

RAILS, CARS . . .

LOCOMOTIVES PLACED

Reading, two 2400-hp diesel-electric units to Fairbanks, Morse & Co., Chicago.

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BETHLEHEM STEEL

BETHLEHEM STEEL

Five Cleveland Worm Gear Speed Reducers, in view, are engaged in driving the layout table for these Heat Treating furnaces. Sixteen others are in use on other parts of this line, built by the Drever Company, Bethayres, Pa., and installed in the plant of Lukens Steel Co., Coatesville, Pa.

Largest continuous plate line ever built employs 21 CLEVELANDS

THE drives will never be a problem on this, the largest continuous heavy plate line ever built. Twenty-one Cleveland Worm Gear Speed Reducers assure smooth, uninterrupted transmission of power from motors to table mechanism in this Heat Treating furnace line.

Cleveland worm gear speed reducers are ideally suited for an installation of this magnitude. Space is saved by the compact Cleveland design. Installation is easy and maintenance is negligible. You'll find Clevelands throughout the steel industry, in every phase of operation. And, in case after case, Cleveland speed reducers have proved to be so dependable and long-wearing that they outlast the machines they drive.

Get full engineering data on the Cleveland line. Catalog 400 is free—write today. The Cleveland Worm & Gear Company, 3270 East 80th Street, Cleveland 4, Ohio.

Affiliate: The Farval Corporation, Centralized Systems of Lubrication. In Canada: Peacock Brothers Limited.

CLEVELAND
Worm Gear
Speed Reducers

WHAT'S NEW IN MOTOR CONTROL? ☆ ☆ ☆

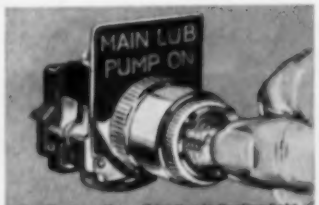
Now...for machinery designers pushbutton units built to the st new Cutler-Hammer Three-Star

These are the world's smallest heavy duty pushbuttons. They require a behind-the-panel depth of only 1 3/32". This is 40% less space than needed by the next smallest units on the market. Double-pole contact blocks are available in all combinations of normally open and normally closed contacts. Each control circu electrically and mechanically isol from the other. Each circuit is cl identified and all terminals are c coded. Rapid on-the-job circuit addi are obtained by stacking contact b on contact block.

These pushbuttons may be flush type, extended type or with mushroom heads . . . in a wide range of colors for quick control identification. Standard, large, and jumbo size legend plates fit every type of operator and indicating light in the entire line.

A
pushbutton
that saves
its entire
installation
New attach
Its pushbutton
in minutes;
adjustments.
alignment nor
of units is
Pushbuttons
bind or stick;
operate perfect

The C-H one-hole mounting oil-tight indicating lights with new wide-visibility lenses are the most visible from all angles by actual light meter tests. Available in either transformer or resistor types. Lenses offered in six dis-tinct colors.



ProoTest . . . the self-testing indicating light. Vital to safety and proper use of machines, particularly in automation. ProoTest now permits instant proof light is NOT off because of burned-out bulb. Merely pressing on the light lens disconnects bulb from its normal circuit and checks it on a test power supply. Resistor and transformer types available.

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signers...new heavy duty
the standards of the spectacular
ee-Star Motor Control

h control circuit is
hanically isolated
h circuit is clearly
rminals are color
ob circuit additions
king contact block

A maintained-contact pushbutton assembly that saves more than its entire cost by installation savings. New attachment with its pushbuttons mount in minutes; no fussy adjustments. Neither alignment nor spacing of units is critical. Pushbuttons will not bind or stick; always operate perfectly.

☆ *they install easier*

☆ *they work better*

☆ *they last longer*

Design engineers are quick to recognize that these new heavy duty pushbuttons have *everything*. There is nothing on the market like them. They are amazingly compact to require the least back-of-panel depth. They are one-hole mounting and they are oil tight. They easily provide for as many as eight separate control circuits per pushbutton, eight completely isolated heavy duty contacts either normally open or normally closed. The buttons may be flush type, the extended type or with mushroom heads. They can be black, red, yellow, green or gray. See the new one-button control station, C-H Roto-Push. See the easiest-to-install maintained-contact pushbutton attachment and the means for padlocking any of the standard pushbuttons. There are both knob and key operated selector switches in this complete line. Also matching indicating lights and the new automation safety light, PresTest. Be sure you have complete information *now*. Write today on your company letterhead for a copy of the new Cutler-Hammer Panel Builders Handbook Pub. EE-120. CUTLER-HAMMER, Inc., 1211 St. Paul Ave., Milwaukee 1, Wisconsin.

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☆ ☆ ☆
MOTOR CONTROL
C-H

The most complete line of oil-tight selector switches on the market. Key or knob operated; two or three position. Positions may maintain contact or have spring return. Three standard contact blocks provide a wide range of circuit combinations with the use of just a single block. Unlimited circuitry by adding blocks.

Roto-Push ... the one-button control station. One Roto-Push can provide all the control functions for which two or three separate pushbuttons would be used normally. Available in a wide range of selector and button operators. Roto-Push simplifies panel design and saves installation time to cut costs, improves machine-operator efficiency.